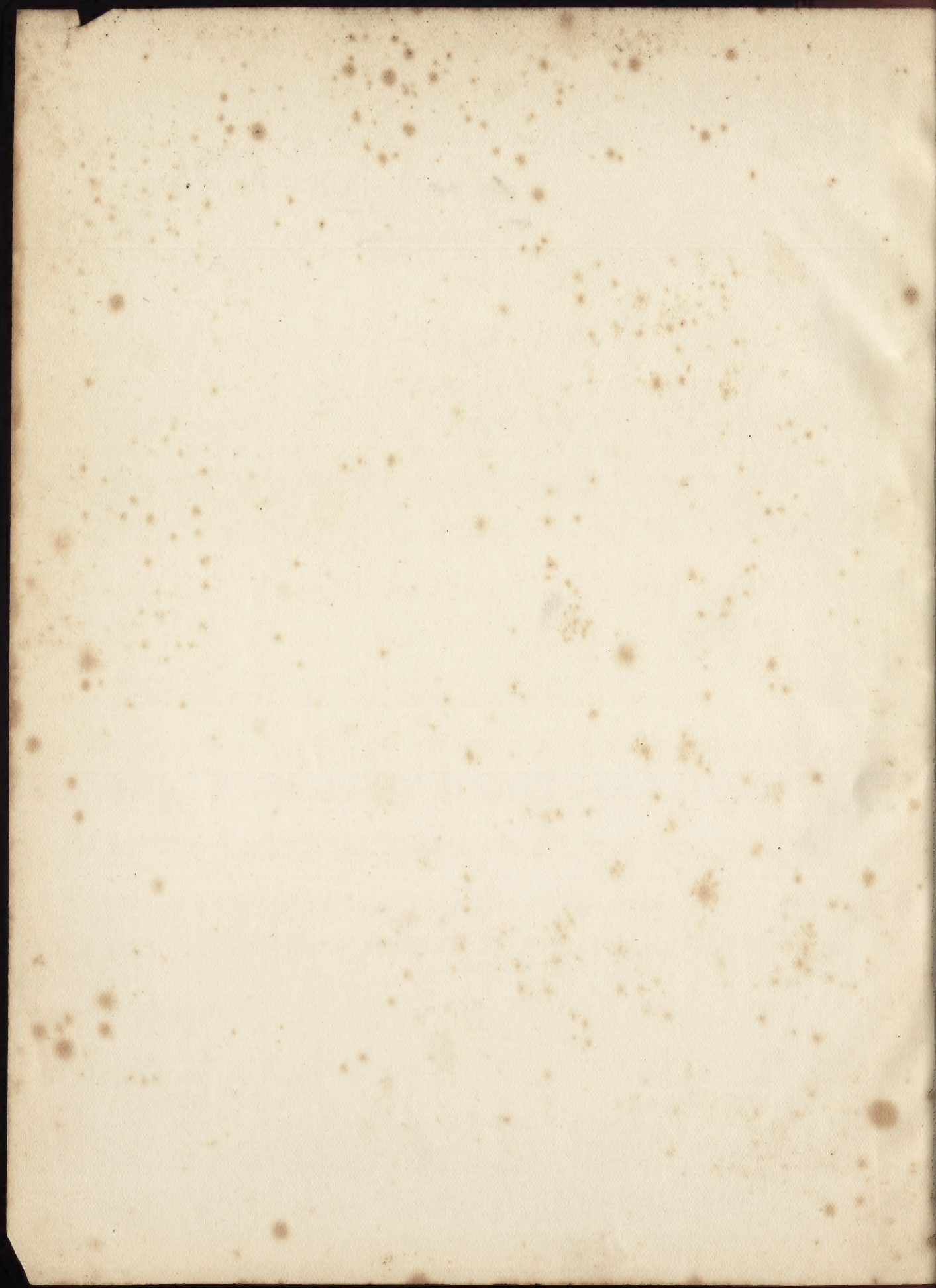
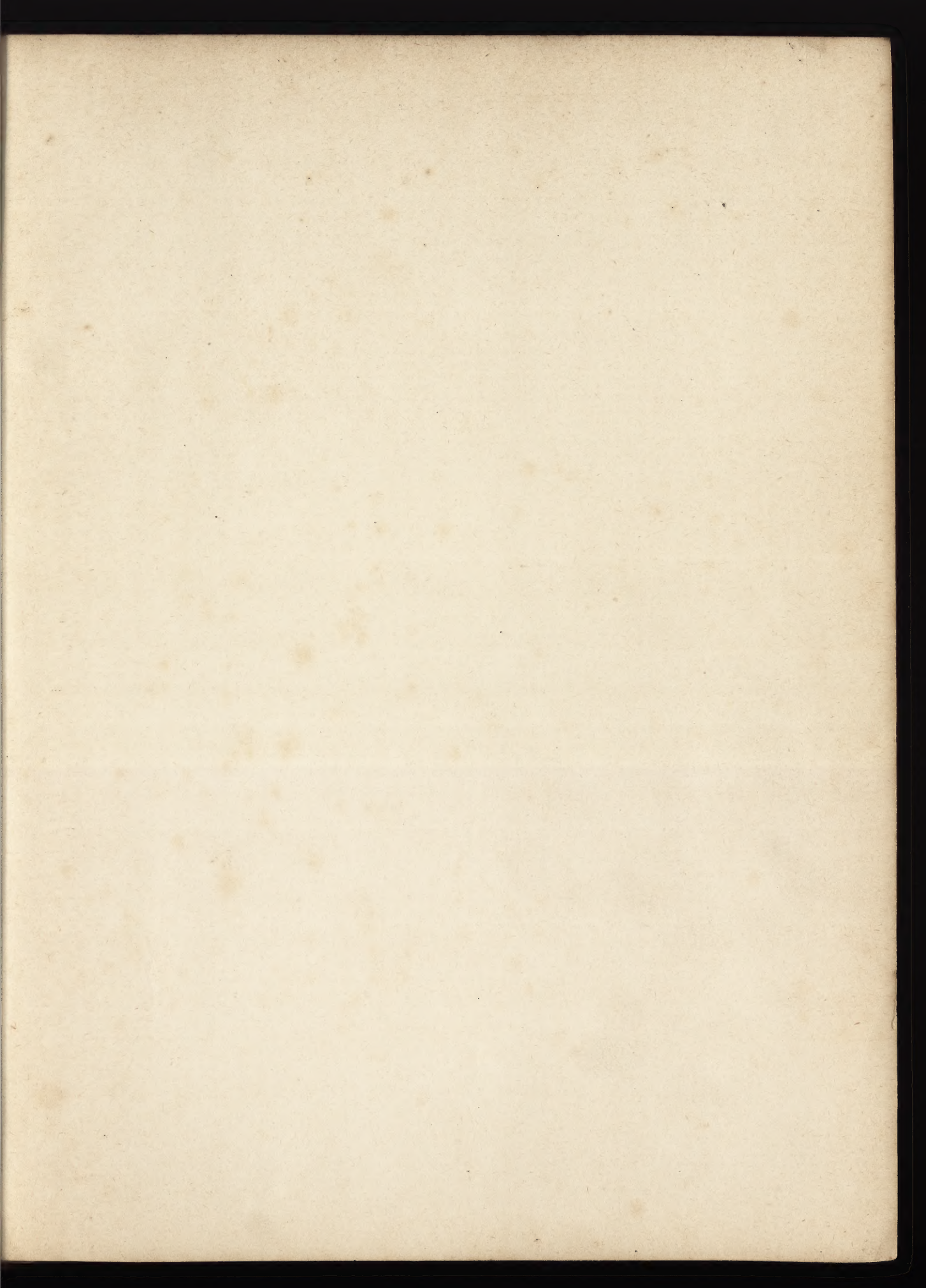
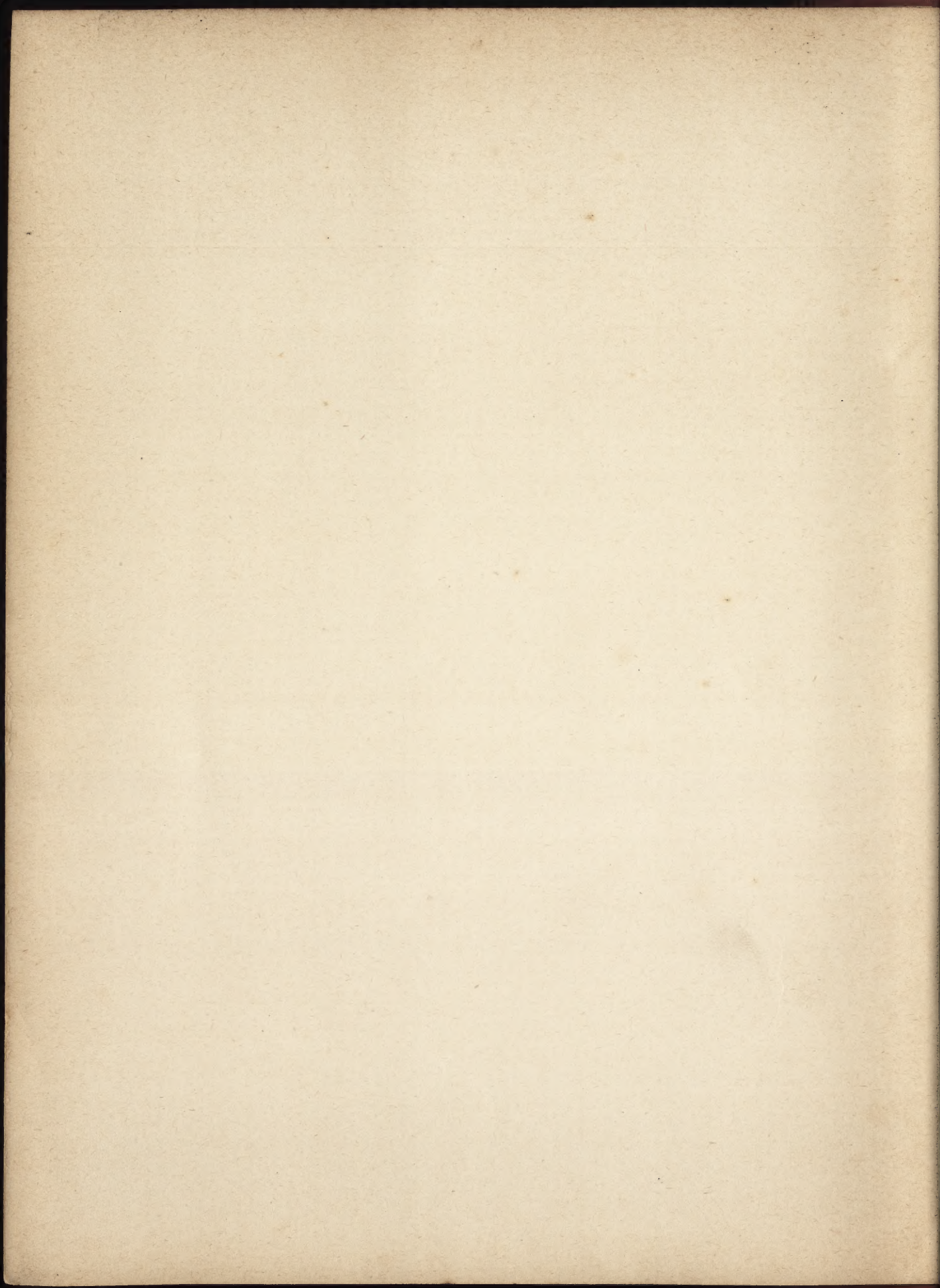


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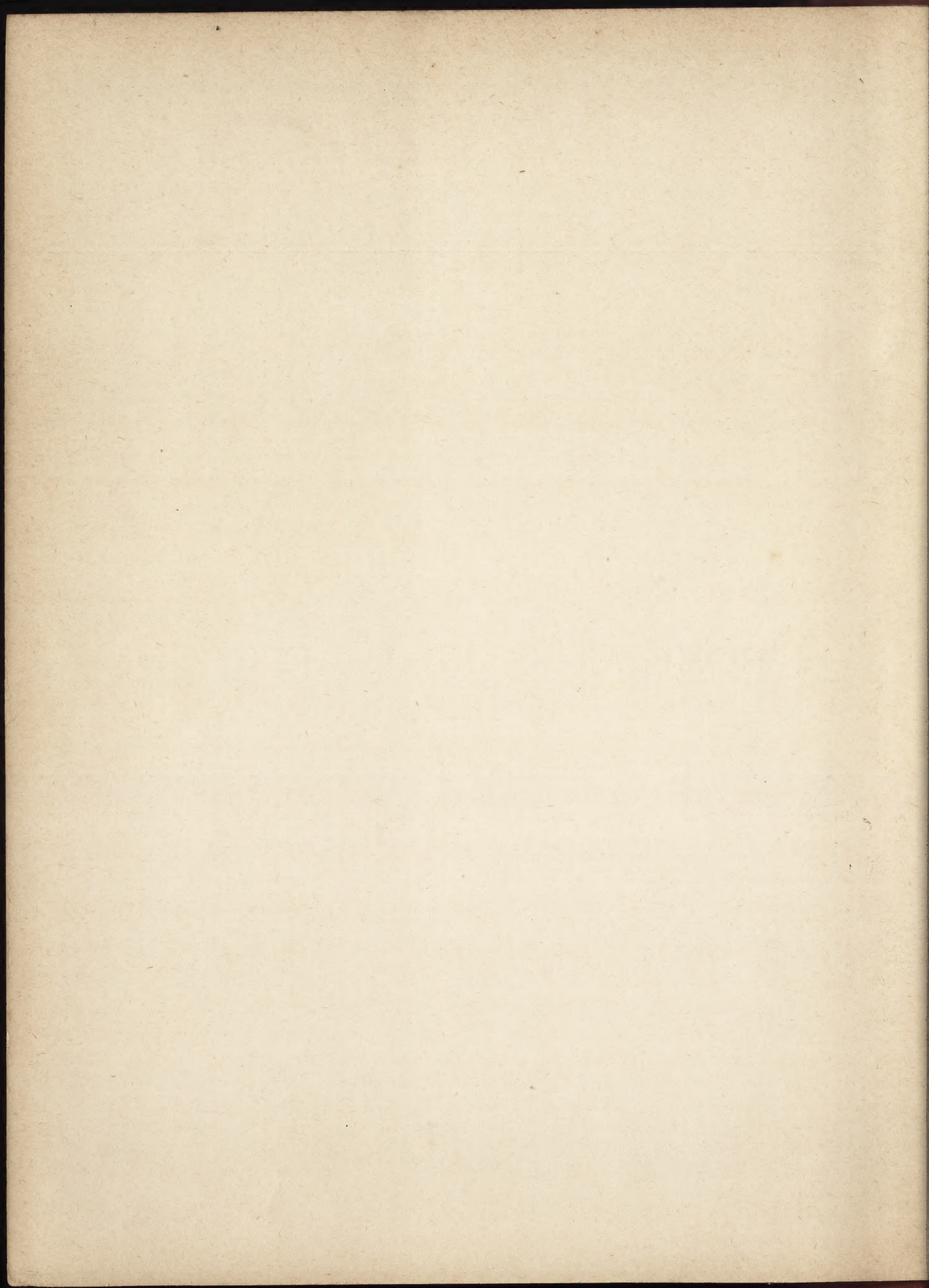
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HOME ARTS AND CRAFTS



HOME ARTS AND CRAFTS

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HOW TO TEACH YOURSELF

| | | |
|--------------------|------------------|-------------------|
| MODELLING IN CLAY | SAW-PIERCING | TEXTILE DESIGNING |
| MODELLING IN GESSO | ETCHING ON METAL | TILE DESIGNING |
| WOOD CARVING | METAL HAMMERING | DAMAGED CHINA |
| FRET SAWING | BENT-IRON WORK | RESTORING |
| POKER WORK | APPLIED DESIGN | "GRANGERISING" |
| PYROGRAVURE | ORNAMENT | TAXIDERMY |
| LEATHER | WALL-PAPER | ETC., ETC. |
| DECORATION | DESIGNING | |

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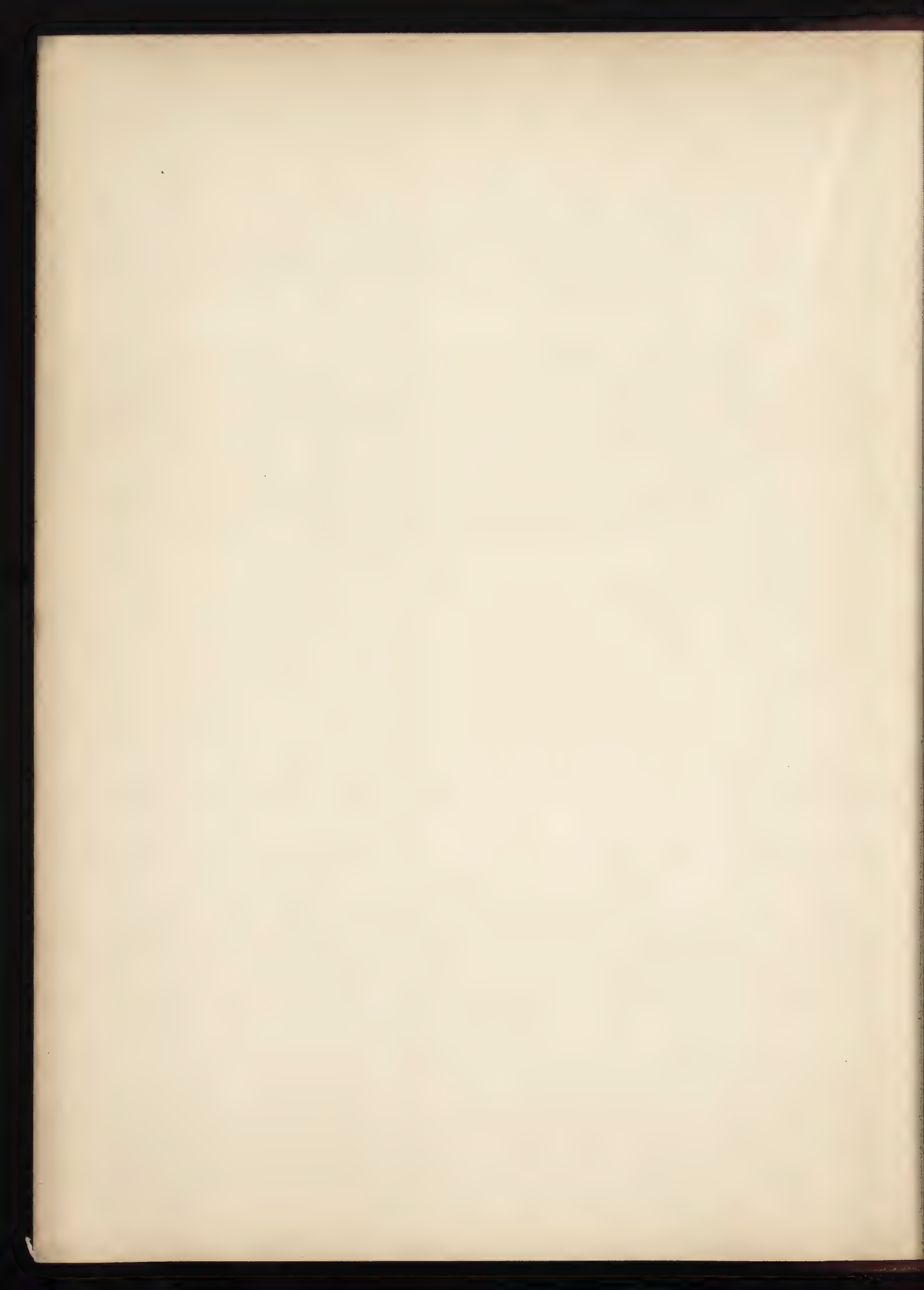
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MODELLING



MODELLING IN CLAY.

I. MATERIALS AND APPLIANCES.

OUR oft-expressed advice to the novice not to attempt this or that branch of the graphic arts without having acquired the rudiments of drawing need not apply to modelling in clay—at least in its first stages; for such modelling is natural drawing, and is wisely taught as such to very young children in the kindergartens. We need hardly say, however, that with a knowledge of drawing the serious student of sculpture will do much better than without it.

Lighting.—For modelling, the light is better coming from above than from the side. When only a side light can be obtained, it will be necessary, after working on one side, to remove the model so that the light may fall on the other; otherwise, if a likeness is aimed at, it will be perceptible only under one particular light, and from only one point of view. A good portrait should strike from every aspect. When working by gas or candle light, the position where the light can come down upon the front of the work is best. It is most safe, where possible, to vary the position of the light either by shifting the light or the position of the model.

The Clay.—It is the fine, gray stone-ware clay that is wanted. It may be bought of the artists' colourman, in boxes of various sizes. For a bust, about twenty-five pounds dry weight are needed; for small objects, as a hand, foot, or panel of flowers, four or five pounds will suffice. If the clay is procured from a pottery, see that it has been well washed. If too dry, it must be soaked in water until of the consistency of dough; this result will be hastened by breaking up the clay.

The Tools really necessary are but few, although there is a great variety of shapes and sizes. The wonderful human hand is the best modelling tool of all.

Besides tools, you will need wires bent in round, oval, and triangular loops, and fastened in handles; and a board to model upon, strengthened so that it will not warp (see fig. 180).

If you wish to model a bas-relief, use an easel

and set the board on it, having first put some nails in the board to support the weight of the clay; if your work is in high relief, carry wires from nail to nail.

To Model in Relief upon a plaque, it is a good plan to take a shallow jelly-cake tin or the cover of a paint-pail, and fill it evenly and smoothly with clay. Have a good outline drawing of your model. Lay the design upon the surface of the clay, which should be firm enough to take the impression as you trace the outlines with a pin or pencil. When you have traced the drawing, carefully remove the paper. Then scrape away the clay all around the outline to the depth of about one-eighth of an inch, and proceed to work up the design, keeping everything in the background as low as possible, and being most careful to leave no edges standing up in such a way that the wet plaster can run behind and interfere with the withdrawal of the mould. When there are such projections it is necessary to make the mould in separate pieces, or to use a gelatine mould (to be described later on). Keep your tools clean during work by dipping them in a bowl of water. A soft inch-wide brush dipped in water will suffice to keep your work smooth.

When leaving the clay upon which you are working for the day, sprinkle it, covering it with a wet cloth, and placing it where it will be protected from evaporation. A good way is to turn a large tin basin over it. Experience will soon teach you how wet to keep the clay. If on returning to work it is found too dry, pour water over it until it has absorbed enough to be in good condition.

When you have finished modelling, and before making the mould, remove the work from the tin (which is very easily done), and place it on a newspaper, setting the whole into a basin.

For a model in the round it is convenient to have a zinc cover like fig. 183. It can be made of any desired size by a tinsmith. This cover being set over the model, with a bowl of water beside it, the exclusion of the air and the moisture rising from the bowl will keep your work soft and damp enough to be perfectly workable for several weeks.

II. WORKING FROM THE CAST.

An inanimate model is the best for the student to begin with. In a living model a change is constantly going on in form and expression, and considerable training is necessary to enable one to cope with such conditions. A square, strongly marked cast of a hand or foot, however, affords an immovable as well as the most serviceable subject for first lessons in modelling; it can be bought at little cost, of any cast-maker.

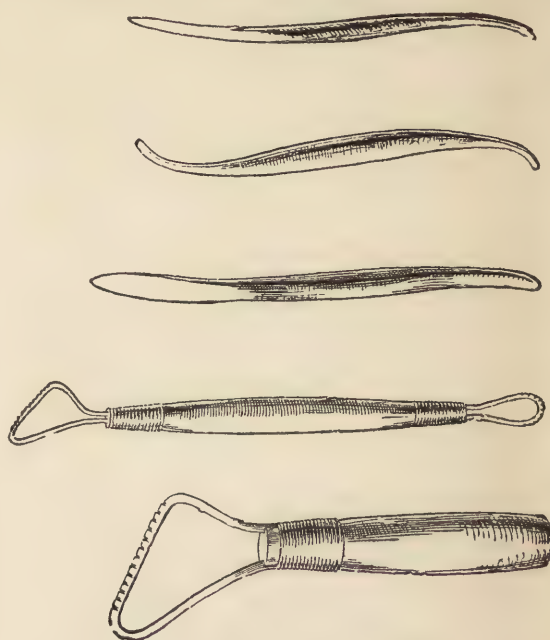
Take a board of convenient size and put up the clay upon it, somewhat in the shape of the object to be copied. Measurements should be made to guide you in this. Whenever you are uncertain as to a proportion, measure it. Observe, first, the proportion of the width to the length, and block your subject in roughly, in broad, square planes or flats. In a foot, make one plane in the centre, from the top of the instep to the toes, then a simple, square plane on the outside and a broader flat on the inside: block the ankle in four planes, front, sides, and back of each toe in three planes, and so on. The study of the flats or planes in modelling is all-important, as it is the true secret of the mechanical principle of the art. The whole human figure, from the head to the foot, is composed of a series of flats, small or large, short or long, according to the proportions of the body. The first principle you have to master, then, in regard to your art, is expressed in the square cast of the foot or hand.

Different features of the face should also be modelled in the same way. Casts of the eyes, nose, mouth, and so on, can all be purchased for this purpose. In copying, be careful to block in everything very squarely, even exaggerating the planes. Try to be accurate in the measurements. A pair of callipers (fig. 184) will be a great aid. A correct measurement in a cast is like an outline in a drawing—it is the backbone of the work.

In beginning a face (keeping in view always the measurements of each part and the whole), observe carefully the flats or planes, blocking

in the forehead first, the centre being about twice as large as the sides; the nose in three flat planes, one through the centre and one on each side; then one down the front of the cheek-bone, extending down through the chin, and one large broad plane from the termination of the cheek-bone or corner of the eye, extending backward to the ear and downward to the jaw-bone. After roughly blocking in the face in this way, the minor planes can be studied and put in.

Modelling a Bust.—In modelling a bust,



FIGS. 175-179.—TOOLS USED IN MODELLING

proceed on the same plan, following the flats and planes, and working on the front and sides alternately, keeping always in mind the proportions in length and breadth and the relative masses.

It will be necessary to have a revolving plinth to enable you to see your work from all sides and in all lights conveniently; a revolving office stool shortened to a convenient height, with a top provided of a heavy board that will not warp, is a capital makeshift for the regular thing (fig. 185). An upright piece of wood, with a short cross-bar to

support the head and shoulders, must be fastened firmly in the centre of the top. The clay should be packed up as solidly as possible



FIG. 180.—BOARD FOR RELIEF MODELLING.

with a trowel into the rough semblance of the model. It is important that the core of the bust should be firm and compact, as the clay settles by its weight and the pressure of working on it. Some persons use glue water for wetting the trowel at this stage of the process. When you have the rough shape of the head and shoulders blocked to about the right size, commence with the features as seen in profile, carving out and building

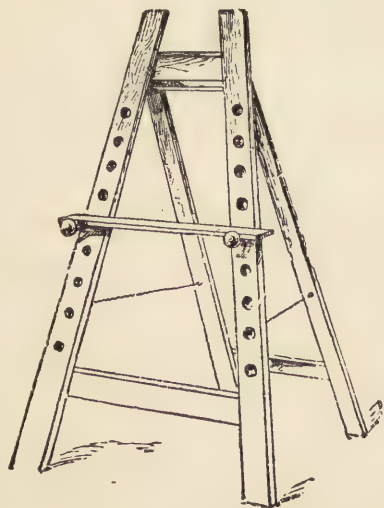


FIG. 181.—EASEL FOR RELIEF MODELLING.

up until you have secured the correct outline, taking care that it comes in the centre of the face. Then turn the bust facing you and

mould the features. It is well to have accurate measurements of your model, unless your eye is very true.

A support that will serve can be made by fixing legs on a common sieve, so that it will stand over the bust without touching it. Over this a wet flannel cloth can be drawn down and fastened to the plinth, and the whole covered with a waterproof, or anything that will exclude the air.

III. WORKING FROM LIFE.

In modelling a bust from nature, place your sitter not less than six feet from you, so that you may see the whole head at one glance. If brought nearer, only portions of it can be seen at once, and one part ought never to be modelled without due reference to the rest, and each part should be advanced equally with the others. This rule must be kept constantly in mind, as it is only in this way that the harmony of the whole can be preserved.

The two sides of a head or face, when looked at separately, are generally found to be different in form. It is rarely that we see in nature a face that is in perfect drawing; but almost all have the appearance of being so, because of the fact that though the form may be different on either side, the weight is equally distributed, which gives the effect of harmony.

That it is useless to introduce details until the contour has been completed applies in every branch of modelling, and particularly in busts. As in map-drawing, if the countries are wrong, the introduction of towns and rivers will not make them right. Before introducing the mouth and eyes, be sure that the head is in proportion to the shoulders; that the width of the head is in proportion to its length. The nose may then be roughly indicated; after this the ears, whose position at the sides of the head should be determined from the nose, as the position of the ears varies in different heads. In some cases the ears are situated farther back from the

face than in others, and sometimes higher up than in others. The opening or orifice of the ear is, in some heads, in a line with

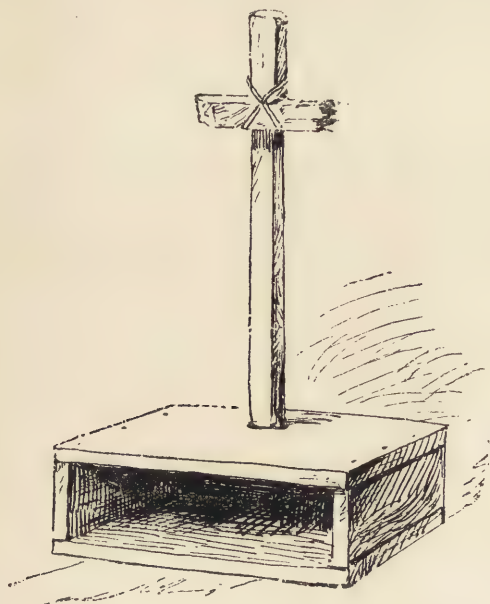


FIG. 182.—SUPPORT FOR MODELLING A BUST.

the lower part of the nose, in others it is as high up as the eyes. The place of the mouth should be judged of from the nose, and indicated near to, or distant from, the nose according to the length of the upper lip. The eyes, too, in some heads are set nearer to the nose than in others, and sometimes more deeply. The hair must be studied carefully in relation to its effect in contrast with the face. Study it in masses, always endeavouring to preserve the character of its movement, composition, and flow of lines. Do not

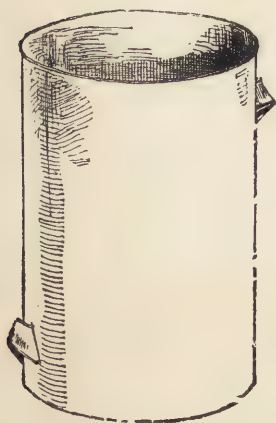


FIG. 183.—ZINC COVER FOR MODEL.

attempt to copy it in detail: to do so would be most inartistic. You must not look for a likeness immediately. Pay attention solely

to the proportions and balance of the masses and planes, and the portrait will come.

The Full-length Figure.—For a large figure it is necessary to have a plinth so arranged that it will turn freely on its rollers in spite of the heavy weight of the clay; there must be an upright iron post to support the body, and to this must be fastened supports for all the limbs and different parts of the whole figure. Plumbers' pipe answers admirably for this purpose, and braided copper wire for the hands and fingers. The services of an experienced person should be employed to arrange these complicated supports, for any fault in them will give serious trouble.



FIG. 184.—MODELLER'S CALLIPERS.

The Stand.—It is usual to model the bust without a stand, and procure the stand after the work has been cast in plaster. Stands may be had ready made.

In modelling the human figure, a knowledge of the external muscles will be of great advan-

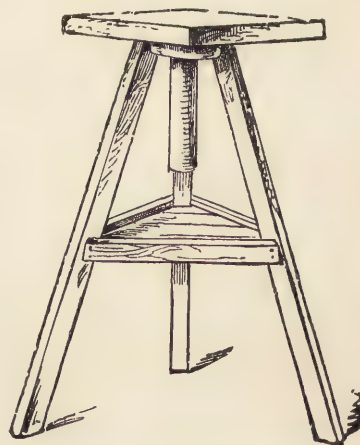


FIG. 185.—MODELLING STAND.

tage. This may be gleaned from anatomical figures. Plaster casts of these, ranging to about two feet high, can be bought. There

is a very fine reduction about this size, by Flaxman, of the Gladiator, which is most useful in the study of figure-drawing or modelling. In schools of art this is a favourite subject to copy.

In **Modelling Draped Figures** much attention is needed in the proper arrangement of plaits and folds. In drapery one particular fold requires another, where a graceful consistency is maintained, as much as a given position of the arm requires a particular disposition and elevation or contraction of its different muscles. The best draped studies are found in casts from the antique. In these the folds or plaits are represented by straight rather than by curved lines. Even where a fold assumes a circular form, it is effected in the best models, not by curved, but by broken straight lines. The zigzag strokes which occur in rough or unfinished sketches, whether drawn or modelled, have an artistic effect which is often lost or made to look mechanical where rounding off or high finish is attempted. In modelling, mere indications have often a more artistic effect than a studied roundness. Running lines, whether curved or straight, exist only in inferior works of sculpture, while in the works of the best masters these are carefully broken up, and arranged in such manner as to avoid offensive repetition. What is said here with regard to drapery applies equally to the hair, where balance should be maintained, but repetition avoided.

The **Proportions of the Figure** have already been considered (see **DRAWING FROM THE LIVING MODEL**); but in sculpture, following the general practice of the ancients, it is usual to allow at least eight times the length of the face (instead of seven) for the height of the body. We say "at least," for in cases where the effigy is to be viewed from an unusual altitude (allowance being made for the consequent foreshortening), more than eight times the length of the face is often allowed.

Taking eight heads as the standard, an idea of the proportion which the limbs should bear to each other may be inferred from the following numbers, which appertain to a figure

measuring five feet ten inches from head to foot :—

| | | |
|----------------------------------|--------|---------------------|
| From ground to ankle | ... | 2 inches 7 eighths. |
| From ankle to knee | ... 18 | " 0 " |
| From knee to hip | ... 19 | " 2 " |
| From hip to collar-bone | ... 16 | " 6 " |
| From collar-bone to top of head | 13 | " 1 " |
| Length of foot, from heel to toe | 10 | " 5 " |
| Hand, finger-end to wrist-joint | 8 | " 3 " |
| Wrist-joint to elbow-joint | ... 10 | " 0 " |
| Elbow to shoulder | ... 12 | " 0 " |

These numbers apply to casts from antique models of the most symmetrical kind.

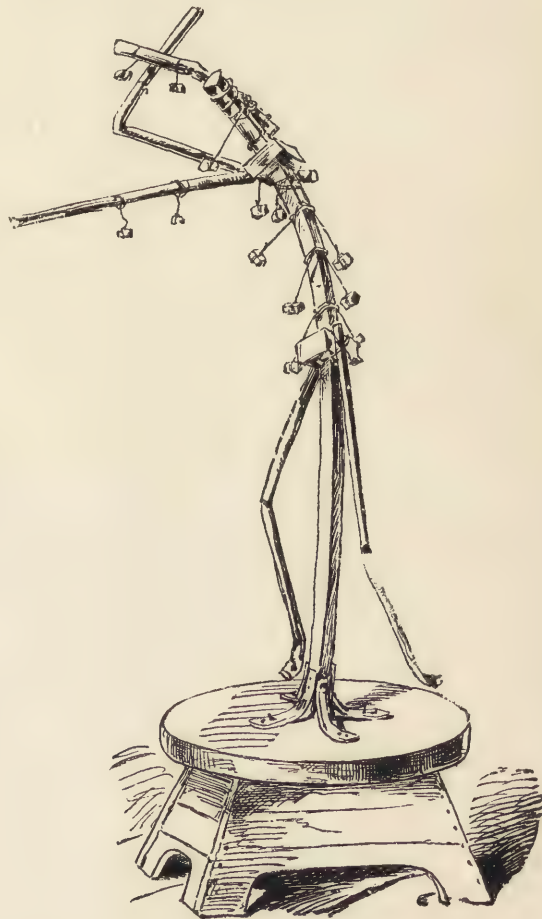


FIG. 186.—SUPPORT IN MODELLING A STATUETTE.

The following method of measuring is recommended to secure correct proportions: Cut a stick of wood the same length as the figure

intended to be modelled, whatever its size may be ; mark off the same into twenty-four equal parts, then number each part in regular order from end to end.

modelling clay. Be careful that the braided copper wire used for supports does not anywhere come near the surface, and that the work is very compact.



FIG. 187.—ROUGH CLAY SKETCH OF A BUST.

MODELLING IN CHINA CLAY.

For small figures made to be fired, use the best quality of china clay, which can usually be procured at the same price as the common

Tinted Clays.—Charming work can be done in tinted clays. If you live too far from a pottery to avail yourself of the special machinery that is used there for the incorporation of

colour with clay, you must have recourse to the ordinary pestle and mortar, sparing no pains (while the colour and clay are in a powdered condition, these mixtures of clay with underglaze colours (see p. 290), sending them to a pottery for trial by fire before attempting serious work.



FIG. 187A.—FINISHED CLAY SKETCH OF THE BUST SHOWN ON THE OPPOSITE PAGE.

condition, as well as later, when the two have been made damp) to distribute the colour particles evenly throughout the clay by a thorough kneading. Experiment freely in

Medallions of symbolic figures, cupids, flowers, butterflies, doves, etc., can be prepared for insertion or as relief decoration in the following manner: Place in readiness a smooth



ANIMAL MODELLING FROM LIFE. DIRECT PHOTOGRAPH TAKEN IN THE CLASS-ROOM.

school slate, a roller, a pair of scissors, and a penknife, oil, water, gum-arabic or tragacanth, and a "slip" (clay and water mixed to a smooth paste).

Keep the prepared clays, one tinted, the other white, or of similar colour to the body of the object about to be decorated, in a damp condition by drawing over and around them several folds of wetted cloth.

Roll out a thin slab of tinted clay, and stamp or cut it to the required size; should it be sticky, insert a fine linen rag between it and the slate. Press it face downwards to insure a smooth, flat surface when it is required, and cover it with another wet rag.

For original work you will have previously made a model in wax, in low relief, of the forms about to be moulded in white clay and transferred to the tinted slab.

In this wax model you must avoid undercutting. Next, have cast from it, in plaster, an intaglio die; or, if copying must be resorted to, we will suppose that you have selected a subject from one of the small plaster medallions sold by the Italian street vendors.

If a single figure has been selected from a group, make an intaglio mould in plaster from the whole group, and fill up the hollows about the chosen portion while the plaster is wet, that the chosen figure or ornament may become isolated on a flat surface. A dried rush is closer in texture than the finest file. Pass this lightly over the face of your die to polish it before varnishing, and again after the varnishing, that no seam or puncture may appear on the tinted slab that is about to receive the white impress in relief. Make sure that the two clays being used are equally damp, to avoid unequal contraction in drying.

After pressing the white clay within the die (which must be oiled to prevent the clay from adhering to it), remove carefully, with a damp rag or clean brush, any particle that may have fallen upon the face of the die, before pressing the die upon the prepared slab. Press the slab into the position it is to fill while the die is yet attached to it.

If any instrument is used to assist in de-



DESIGN 85.—MODELLING IN CLAY, PANEL IN HIGH RELIEF, FOR THE DECORATION OF A FIREPLACE.

taching the moulded figure from its die, remove the evidence of the abrasion caused by it. Should it happen that the moulded ornament



FIG. 188.—SIMPLE RELIEF MODELLING IN PORCELAIN CLAY.

does not readily adhere to the slab, or the slab attach itself as firmly as required to its appointed place, mark lightly on the slab beforehand, by gentle pressure with the die on its surface, the exact position to be held by the applied ornament in white. Make one or two marks on the slab and on the mould that will enable you to fit them together again with precision. Roughen by scratching with a pointed tool the surface plan of the ornament on slab and mould, and paint into these scratches the prepared slip. Then repeat the process for attaching the medallion to its final position.

The pressure needed to attach one clay to another should be applied evenly and firmly at every point. The skilled modeller adds delicate lines and touches, here a little and there a little, while preserving the general features obtained by moulding. In like manner, after transferring, for instance, the body of a flying cupid in low relief by the above process, a couple of butterflies in leash, or a spray of vine or flowers could be delicately modelled with the brush in white clay on the tinted slab, after the manner of raised work in china painting (see p. 279). The penknife or other tool, such as those used in wax modelling,

may be had recourse to for sharpening the contours.

To relieve the hard effect of a round or oval slab, appropriate modelled or moulded wreaths, garlands or other ornament can be introduced at proportionate distances from the central slab. This class of modelling is usually kept free from overglaze, which is liable to blur its otherwise sharp, cameo-like appearance. An extreme nicety of finish is imperative.

A soft camel's-hair brush, dipped in water and drawn across a squeezed sponge, is used

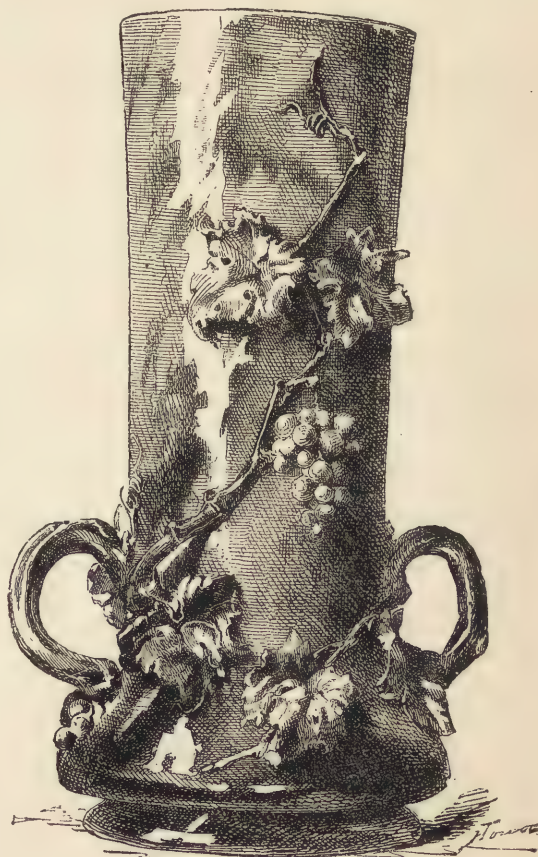


FIG. 189.—VASE IN SCULPTURED CLAY.

(By Messrs. Haviland & Co.)

for the complete blending of the outer edges of the relief with the background. A few of the delicately carved bone or ivory tools used

by modellers in wax will also be of use. In skilled hands they work wonders in bringing out a light or a shadow by retouching. A smooth surface suffices for a background for well-moulded figures, though some kinds of ornament call for an "embossed" background.

MODELLING IN WAX.

Wax for minute work, both in relief and in the round, is an extremely useful material, and when well prepared and coloured works easily and produces pleasing effects. In no sense can it, however, be made to supersede clay for more vigorous and large work. It has the especial advantage over clay of being clean to handle, and the work may be put down and taken up again at any time without injury to the material—which does not require frequent wetting, like clay. A medallion, for instance, may be carried about in a box in the pocket, and taken up for working on at odd moments.

Modelling Wax.—The ordinary kind—it may be bought of any artists' colourman—is made in the proportion of 8 oz. yellow wax, 1 oz. Burgundy pitch or white (not spirits of) turpentine, and $\frac{1}{2}$ oz. lard, melted at a low heat, so as not to bubble, the ingredients being well stirred in, and red lead, in powder, used to colour it. When perfectly mixed the wax is turned out on a slab to cool.

The best recipe, perhaps, is as follows: 1 lb. yellow beeswax, 1 oz. Venice turpentine, 1 oz. Burgundy pitch, 1 oz. white lead, 1 oz. yellow ochre (dry powder), 1 oz. powdered corn-starch, $\frac{1}{2}$ oz. tallow. A little red lead may be used as colouring-matter. A perfect mixture, with heat as described in the previous recipe, is necessary. If the compound comes out too hard, a little more Burgundy pitch and tallow may be used to soften it.

"Composite Clay."—For small statuettes and all ordinary work of the sort there is an excellent composition, made mainly of fine modelling clay, mixed with lard and other ingredients.

This may be obtained so cheaply and of such good quality of dealers in the ordinary modelling clay that it is hardly worth while for the student to experiment in making it. It is known as "composite clay." It has some of the qualities of putty, in that it gets soft by the warmth of the hand, and hardens again on cooling, but it does not stick to the fingers and does not crumble. It has the advantage over clay of not requiring to be kept wet and of keeping its shape for any length of time, and over wax of being unaffected by ordinary changes of temperature and of being workable with ordinary tools. The finer work in wax has to be done with iron tools heated in the flame of an alcohol lamp.



DESIGN 86.—MODELLING IN GESSO. PANEL BY WALTER CRANE.

Composite clay may be procured of two qualities, hard or soft; the harder sort being that best adapted for very fine work.

MODELLING (PAINTING) IN GESSO.

Gesso of the old-fashioned kind is a preparation of whiting and size, resembling putty. Employed as a painting ground by the old masters, it has been revived as a most convenient material for modelling in low relief—or rather painting; it attaches itself to any kind of surface, and is delightfully pliant. A firm foundation is absolutely necessary. Wood, plaster, or canvas will do. For fine work wood is best. Simple as it is, gesso is an artist's process.¹

A smooth surface having been laid with gesso and allowed to become dry, the design may be transferred to its surface by pouncing or by use of stencil plates, or else drawn directly with a lead pencil. Wood mantels, panels of clocks or other decorative pieces of furniture and vases are particularly suitable for treatment. Designs are often executed on coarse canvas, and panels of doors and over-doors and spandrels of arches filled in with them. Frames of mirrors used as sconces are sometimes very effectively decorated in this way in low relief. They may be bronzed afterwards.

Two preparations of gesso which have been found to work may be described. The first is very simple, and is a mixture of fine Italian plaster of Paris and glue. Dilute the glue with hot water, then mix with the plaster until it is of the consistency of cream; a little glycerine added will prevent shrinking and cracking. Lay a coat of size or of thin lacquer on the panel or canvas before going to work. The second is a much firmer and harder gesso, and is made by boiling one part powdered resin, four parts linseed oil, six parts melted glue. Mix the whole well together. Too much care cannot be taken with this latter mixture. Soak whiting in water, and add it to the prepared mixture until it is also of the consistency of cream. The quality of whiting is to be varied or modified in proportion to the degree of

fluidity required in the character of the work. The second mixture has many advantages over the former. It is slower in drying, giving one more time for final finish. It is better for delicate work. It sets more firmly, and takes a finer polish when hard. Combined with Naples Yellow, it bears a great resemblance to ivory.

In England painting on gesso has been largely applied to the enrichment in relief of walls and ceilings of mansions, and this in many instances by young ladies both as amateurs and professionals. Walls and ceilings are divided into panels formed also in gesso, a trailing flowering plant often being very suitable for the purpose, while the frieze may be formed of processional figures or scrolls and leafage. Meandering tendrils in the Louis Quinze style, delicate and lightsome, are excellent for divisions of ceilings. Wall panels may have corner-pieces and central figures, but they also admit of large and imposing tableaux, for there is no limit in the way of relief work in gesso. Abundant pictorial designs may be met with in metallic relief plaques, in carvings, engravings, and in porcelain and faïence statuettes. For the chief masses of the design, it is best to lay on at the outset the whole amount of material required, thus saving time and labour in the shaping.

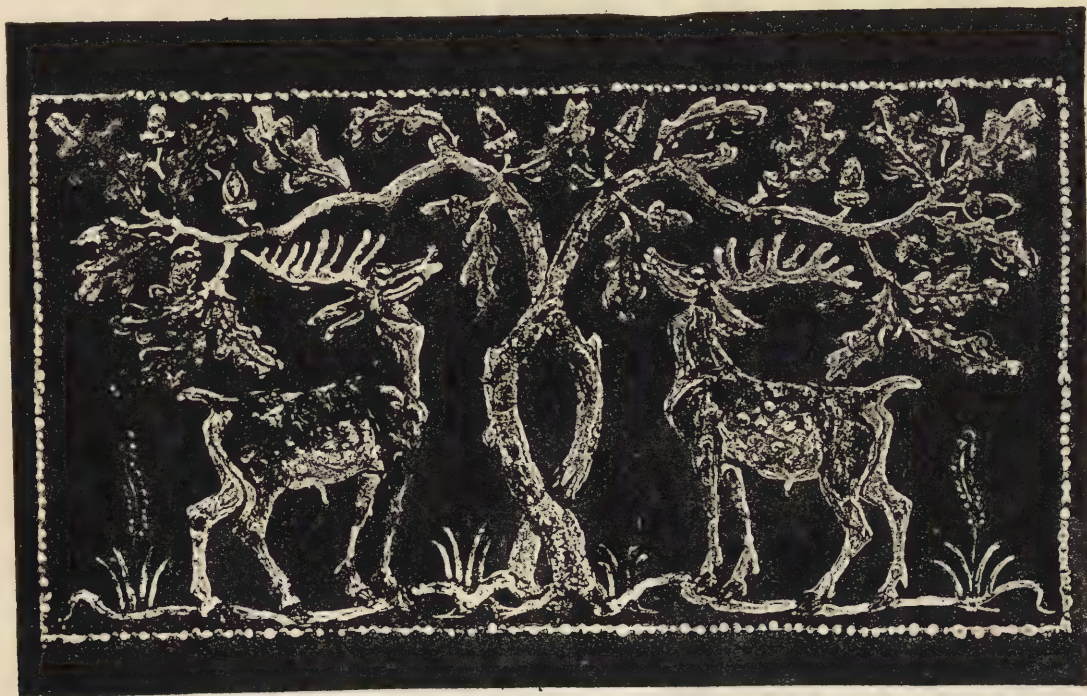
Water colours are preferable to oil colours in painting the relief work; for these no preparation of the ground is necessary. Oil colours require the previous laying on of a coat of shellac. For gilding, a thin coat of oil gold size is to be laid on.

But of all the finishes employed, and the special feature of the revival of the art, lacquers of various colours prepared for the purpose are the most beautiful. These metallic lustres give a unique effect to the finished work, recalling Limoges enamels.

PLASTER CASTS.**I. FROM THE CLAY MODEL.**

To make a plaster cast, first prepare a quantity of plaster mixed with water to the

¹ At the exhibitions of The Arts and Crafts, Sir Edward Burne-Jones, Mr. Walter Crane, and Mr. Spencer Stanhope have been notable contributors in this form of decoration.



DESIGNS 87, 88.—MODELLING IN GESSO. PANELS BY WALTER CRANE.
PHOTOGRAPHED FROM THE ORIGINAL WORK.

consistency of a thick cream. Apply this little by little to the object until the plaster is of the proper thickness—a quarter of an inch or more, according to the size of the piece. The plaster must be kept stirred from time to time, to avoid the formation of lumps and bubbles. If the object is a complicated one, such as a group, it is best to cut the clay or wax model into simpler parts with a fine wire, and mould each of these separately; otherwise there may be great danger of breaking. But each portion before the group is taken asunder should be marked, so that it may be easy to adjust the various pieces of the cast in their proper places; or the same end may be attained in simpler pieces without cutting the clay, by stopping off the plaster along certain lines with bands of wet clay dusted with dry plaster, so that they may not stick too much to the figure.

Thus a bust may be moulded in two sections, dividing it by means of a clay band running from the top of the head, behind the ears, and down the neck and shoulders. When the front half has been moulded, the band is taken off and another supplied exactly on the other side of the dividing line. The liquid plaster is applied with a brush. When it reaches a thickness of a quarter of an inch it is well to apply a thin coat of wet clay, so that in breaking up the mould, as will be explained presently, you may know when you are approaching the proof within. Outside the clay the plaster may be put on thickly, and as much of it as may be judged necessary to make a solid mould, which may be further strengthened by encasing lengths of iron or copper wire in it, running in various directions. The wires should be varnished. Lengths of hempen thread or twine are often used instead.

The two parts, as we will suppose, of the first mould having been obtained, they are coated on the inside with soap water—that is, black soap dissolved in hot water, boiled and well skimmed. This is to prevent the plaster from absorbing too great a quantity of olive oil, when a proof is to be obtained. Two coats of oil are, nevertheless, often necessary to prevent the plaster of the proof from adhering

to that of the mould. This done, each part of the mould is well coated with plaster on the inside, the two are brought together, tied firmly, and left for twenty-four hours. The mould is then chipped away with chisel and mallet, the couch of clay enabling the worker to knock off the greater part of it without endangering the proof within. The clay is picked off with the fingers, and then the inner coating is removed with very great care.

You now have a cast of your original clay model; but for all your care it will, very likely, be imperfect in places; besides, it is only one cast, and you need a set of moulds from which you can take any number of casts. Again, the white plaster discovers slight defects of modelling which may have passed unnoticed in the clay. This first proof may therefore be considered pretty much as a sketch, to be further worked upon and corrected. This is done by applying wet plaster wherever needed with a brush, and working upon it when dry with the steel tools, chisels, and files, used also by the sculptor in marble. Very much may be done in this way which would be difficult or impossible in the clay.

The moulds of the second set, made from the finished proof, are not intended to be broken. They are therefore made in many pieces, which may be detached one by one without danger of breaking. Thus a mask may be divided into as many as a dozen pieces, each side of the nose being moulded separately, each cheek, the hollows under the eyes, the chin, the ears, the forehead in three pieces. Each section, being outlined on the first proof, is oiled (the proof having first been treated with soap water), and the plaster is put on as before, only thinly. The piece thus obtained is trimmed at the edges, oiled, reapplied on the proof, and then the plaster is applied on the pieces next to it, coming, of course, exactly up to the edges of the first. These pieces are firmly tied together for the casting, which proceeds as before, but which should result in a perfect cast when the different pieces of the mould are carefully picked away from it. Lines will, however, often show in relief on the cast

at the junctures, and these have to be carefully removed, and the surface made even with emery paper.

II. FROM LIFE.

To make a plaster cast from the life is a matter of some difficulty, because it has to be done quickly. The skin must be well oiled, so that the plaster will not adhere to it; in the case of a hirsute male model, it is even well to use butter or oleomargarine, and to apply it somewhat thickly. In taking a mask of the face, mouth and eyes must be kept closed, and the nostrils must be stopped with wax, through which quills are inserted for the model to breathe through. An arm must be well supported at the wrist and elbow, for the weight of the plaster is considerable, and the special difficulty of the work is due to involuntary movements of the muscles trying to adjust themselves to this weight, which causes the plaster to slip. For the same reason the more quickly the work is done the better.

To make the plaster set quickly, mix some powdered alum with it. Common salt would do, and its use is sometimes recommended; but it adds to the adhesive property of the plaster, and more oil or grease must be used, which makes it impossible to attain the natural texture that a cast from the life should have. You must decide quickly about the number and shape of the pieces into which the shell is to be divided, so that it may be withdrawn easily from the model. A waxed silk thread is to be used for cutting; but since the shell cannot be made very thick, breakages frequently occur, and much skill is necessary in putting together the pieces of the mould in order to get a cast from them.

The interior surface of the mould must be coated with shellac to render it less absorptive, and must be freshly oiled before using. It is useful, in addition, to mix a little colour in the plaster that is prepared for the cast, so that if even a trace of it adheres to the inside of the mould it will be detected, in which case it is to be carefully removed with

a sharp penknife blade, and adjusted in its proper place on the cast; for, as before said, the special beauty of a cast from life is in its natural surface.

A very slight addition of yellow and red ochres in powder will give something like the warm hue of flesh.

Everything depends upon the quickness and upon the thorough mixture of the plaster. Plenty of it should be in readiness, and it should be mixed as thickly as the water will hold, leaving just an inch or so of water at the top of the bucket.

III. GELATINE MOULDS FOR PLASTER CASTS.

Gelatine moulds are made of small objects, for the purpose of avoiding the trouble of having moulds in several parts. The object moulded from, whether of plaster or other material, should always be oiled. It may then be dipped in a solution of gelatine, and when the coating has solidified, other coats may be applied by a brush until it is thick enough. It is cut with a sharp knife in order to remove it; but, as it is elastic, it need not be cut into separate pieces.

If you have never watched the process, you may find it difficult to make a gelatine mould from printed directions, but we trust that the following hints will be found helpful: Soak one pound of gelatine in water until it has absorbed as much as it can, which it will do in four or five hours. Then apply a gentle heat until it is thoroughly liquefied. If you want an elastic mould, add four and a quarter ounces of treacle, which must be well mixed with the gelatine while hot. If you want a solid mould, omit the treacle and add powdered chrome alum—an ounce to an ounce and a half. The alum prevents the gelatine from being again dissolved in water. If a saturated solution of bichromate of potash be brushed over the surface of the mould and allowed to dry thoroughly, then exposed to sunlight for a few minutes, the mould will become so hard as to be unaffected by water.

WOOD-CARVING.

I. CHIP- OR NOTCH-CARVING.

WOOD-CARVING is easily learned, the tools and materials are inexpensive, and the articles decorated not only can always find a place in the home, but are often saleable.



FIG. 190.



FIG. 191.



FIG. 192.

Fig. 190 shows how to set out a row of right-angled triangles (fig. 191); they are doubled in fig. 192, to form a row of diamonds. Make them the size shown; for, at first, it will be found easier to cut the wood sharply from a small space than from a large one—as in fig. 194, for instance.

Modelling in clay or wax is an excellent, and indeed almost necessary, preparation for the higher branches of carving: carving is only sculpture in wood. Chip- or notch-carving

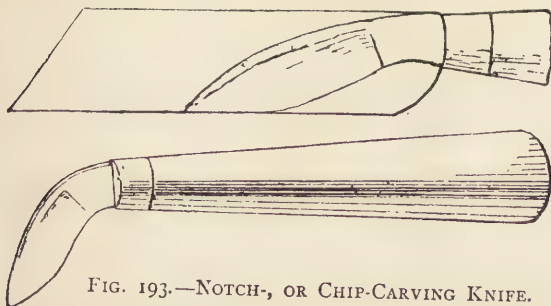


FIG. 193.—NOTCH-, OR CHIP-CARVING KNIFE.

Excellent work may be done with one simple tool: a hook-bladed knife, made by grinding down an ordinary shoemaker's knife, and setting it in a longer handle, will do.

is the most elementary form of wood-carving—the "whittling" of our boyhood.¹ To be more

¹ It is to be borne in mind, however, that wood-carving proper is so much bolder and larger than chip-carving that it may be said to be a different art. For this reason some teachers believe that instruction in wood-carving should precede chip-carving, which can easily be learned afterward.

precise, chip-carving consists of ornamenting wooden surfaces usually, but not necessarily, flat, by cutting various-shaped notches to form a geometrical design. The notches are nearly always made on the slant at the same angle, so that they meet at the base in the form of a V, varying in size and depth according to the requirements of the design.

Chip-carving is so simple that little children in the kindergartens learn to do it easily. It entails no mental strain or fatigue, nor apparatus or preparations. No workman's bench is required, nor, except for the flying chips, is there any suggestion of the workshop; you may sit at the table in the common living-room and whittle away without noise or annoyance to those about you.

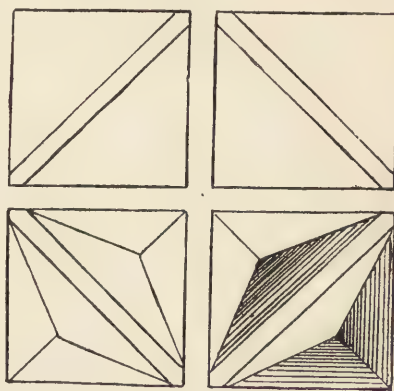
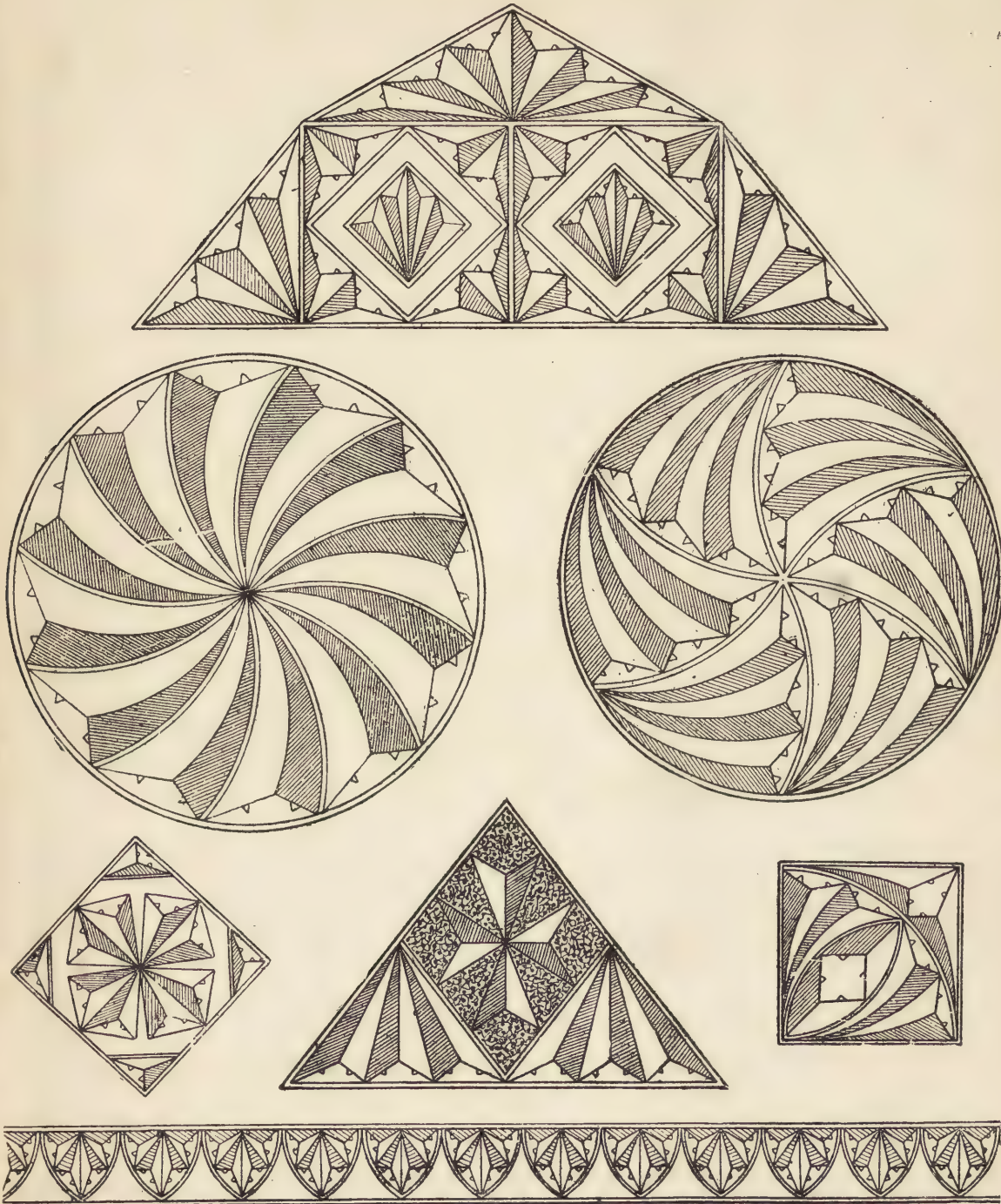


FIG. 194.—ELEMENTS OF CHIP-CARVING.

The notches are nearly always made on the slant, from opposite directions, at such an angle that they meet at the bottom, and form a V-shaped cut.

The peasants of Norway and Sweden, who produce wonderful decorations by simple notch-carving, generally use an ordinary pocket-knife. A hook-bladed knife, something like a small pruning-knife, is a favourite implement. But there are the easily obtained tools of the professional wood-carver, and it is well to begin at once to learn how to handle them. With a small V, or parting, tool, and a veiner, you are equipped for all ordinary work. If you intend to make your own designs—and in that lies much of the pleasure of the chip-carver—a knowledge of at least the elements of geometry



FIGS. 195-201.—MOTIVES AND DESIGNS FOR NOTCH- OR CHIP-CARVING.

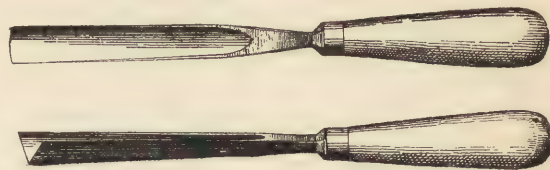
The little "nicks" indicated in the drawing (usual in German work) are not necessary to the designs, and may be omitted altogether. In the opinion of many, they are a trifling attempt at ornament which detracts from the simplicity which should characterise chip-carving.

is necessary, and you should be handy with rule, set square, and compass.¹

Wood.—The most suitable woods for general purposes are lime and holly; pear, walnut, and plane are also good. After some practice, oak will be available; it is too hard for the beginner, who would do better to go rather to the other extreme and use American white wood for his first attempts, although that will be found too soft for serious work.

The wood must be well dressed and made perfectly smooth with the smoothing-plane. Do not use sandpaper, for particles of sand

be reached by a single cut. To cut a second or, worse still, a third time will produce a slovenly effect; and although irregularities



FIGS. 203, 204.—WOOD-CARVING TOOLS. V OR PARTING TOOL AND FLAT GOUGE.

caused by bungling may be rectified by subsequent paring, evidences of the corrections will be more or less apparent.

Among the various objects for domestic use which may be decorated with chip-carving may be mentioned book-racks, newspaper-racks; mirror, photograph, and other picture frames; bread-platters, tea-trays, flower-pot stands, clock-cases, barometer-frames, blotters, and paper-knives. Be careful not to decorate too great a part of the object in hand. In all good decoration the ornament is the more valuable the more it is brought in contrast with considerable plain surfaces.

Finishing.—After the carving is done, sandpaper the surface of the wood not decorated—but not the notches. From the latter remove the dust that will have accumulated, using a stiff brush for the purpose.

Polishing.—Do not varnish the work—it will give it a common look; to oil soft wood causes



FIGS. 205, 206.—HOLLOW GOUGE AND FIRMER OR FLAT CHISEL.

it to catch the dust. A dead wax polish is preferable. For this, use warm beeswax in turpentine, and rub the mixture over the carving with a woollen rag.

Perhaps there is not very much art in chip-

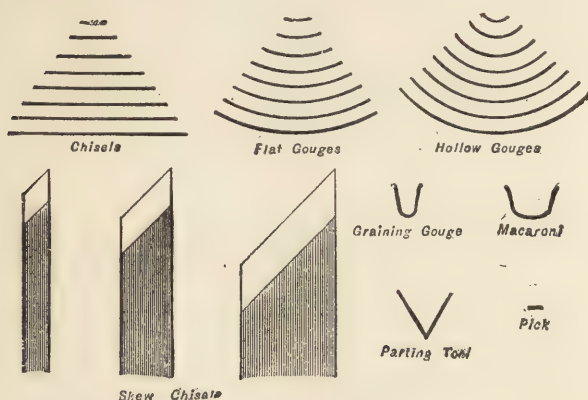


FIG. 202.—MARKS OF VARIOUS TOOLS USED IN WOOD-CARVING.

are apt to lodge in the grain and injure, later, the edges of the tools.

For a First Attempt select a strip of (half-inch thick) white wood about nine inches long and six wide. Clamp it to the edge of the table to hold it firm, and use a strip of thin wood—a piece of a cigar-box would do—between the clamp and the wood, to avoid scratching.

Let each cut into the wood be clean and complete. Cut boldly from the outline to the centre—never from the centre to the outline—and always uniformly at the exact angle. Curved notches are more difficult. Whatever the notch, the desired depth should

¹ In Miss Eleanor Rowe's "Manual of Chip-Carving" (R. Sutton & Co.), which we can cordially recommend, much attention is given to the geometrical side of the subject.

carving; but it teaches accuracy of observation, precision of touch in handling the tools, and how to work freely from the wrist—all valuable qualities for the practice of wood-carving proper, which we will now consider.

II. TOOLS AND APPLIANCES.

It is best for the wood-carver to have a small outfit of tools at first, and to master the use of each tool singly, finding out everything that can be done with it. It is not with the elaborate "set of tools" with finely polished handles, in a



FIG. 207.—POSITION OF THE HANDS.



FIG. 208.—THE HANDS IN USING THE MALLET.

beautiful box, that the best work is done. These are made especially for amateurs, but we advise amateurs to have nothing to do with them; for, as a rule, they are only toys. Buy the tools made for professional carvers. The following will be sufficient, for a beginning at least: one nine-sixteenth and one five-sixteenth firmer or flat chisel; one six-sixteenth corner chisel or skew; a nine-sixteenth and six-sixteenth flat gouge; a six-sixteenth hollow gouge, and a three-sixteenth V, or parting, tool. You will also need a slip of oil-stone formed to fit the concave tools; a mallet, and a pair of coachmaker's iron clamps, No. 14; a little oil, and a sheet of black transfer paper.

The Transfer Paper is not an expensive item, but you can make it for yourself by mixing lampblack and castor-oil to form a thick paste, and then applying it to one side of a piece of newspaper, gently wiping off the surplus grease with a piece of rag.

The Carver's Bench may be a strong kitchen table with a stout pine top. In this case the

legs should be secured to the floor with small iron brackets, to ensure rigidity. The drawer can be used in place of a tool chest.

For those who would prefer to have the regular carver's bench, we would say that it

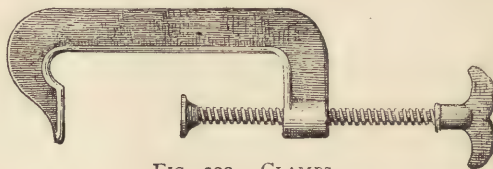


FIG. 209.—CLAMPS.

should not be less than 4 ft. 6 in. long, 2 ft. wide, and from 2 ft. 6 in. to 3 ft. high. The legs should be of pine, 4 in. square, with cross pieces of the same size, dowelled and fastened with what are known as lag screws. The top should be of pine about 2 in. thick, perfectly level and well seasoned, and on the front edge should be fastened, by means of the lag screws before mentioned, a piece of pine 3 in. square, having slots $1\frac{1}{2}$ in. long by $\frac{7}{8}$ in. deep, cut out on the inner side. A thin piece of pine should be nailed along the back and continued along the ends for about a foot, and projecting $1\frac{1}{2}$ in. above the top of the bench, to prevent the tools from rolling off.

The Tool Chest is usually made with three shallow top drawers for holding spare tools, slips, etc., and a large bottom drawer or cupboard for odds and ends.

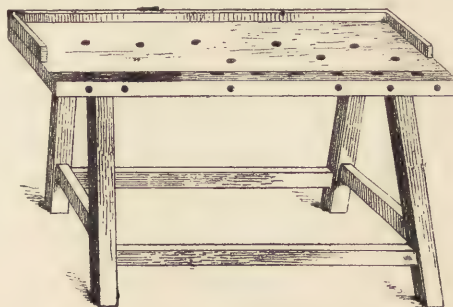


FIG. 210.—A WOOD-CARVER'S BENCH.

"Holdfast" and "Bench Screw."—The means adopted for fastening the work to the bench vary, but most professional carvers use either a "holdfast," a "bench screw," or "bolts"; and

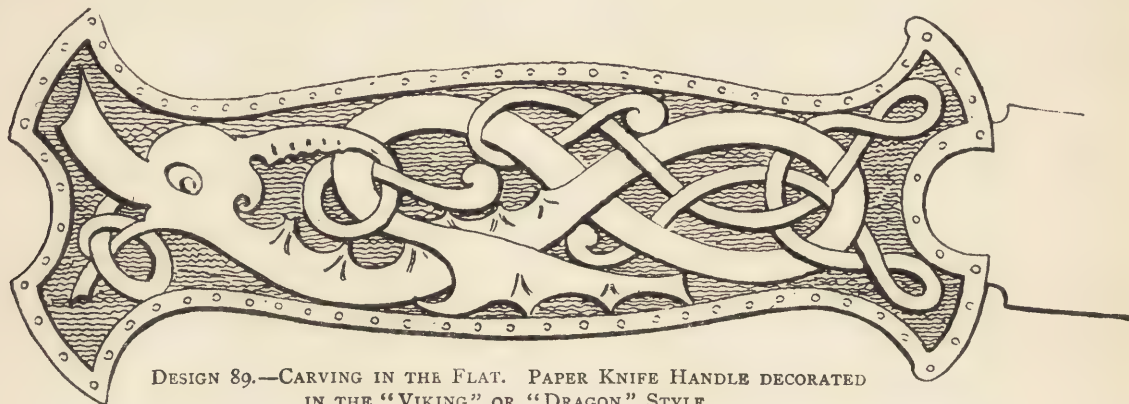
although these articles are not perhaps absolutely necessary for the amateur carver, they are of sufficient importance to merit more than a passing notice.

The "bench screw" is more useful and less clumsy than the "holdfast," and answers the same purpose. This appliance, however, is only suitable for certain descriptions of work which are not too heavy.

"Bench Bolts."—The best contrivances are the "bench bolts," consisting of two pieces of steel 10 in. long, $1\frac{1}{4}$ in. wide and $\frac{3}{4}$ in. thick, to fit into the slots in the edge of the bench. A spring on the side prevents the bolts from slipping, and the projecting heads allow work

the tool in the right hand, keeping the wrist almost down on the wood, and with the thumb and forefinger of the left hand—or the whole of the hand, which is sometimes necessary—guiding the tool and pressing gently, go slowly along, and you will remove a thin, curled shaving. Try to cut these shavings of even thickness, in a uniform, straight groove. Do not move the tool from side to side in the wood. The beginner is very apt to do so when the tool does not glide easily—it is a bad habit to acquire.

When you have succeeded in cutting several of these grooves, straight, and uniform in width, rule lines for similar grooves across the grain. You will find them harder to cut, for the tool



DESIGN 89.—CARVING IN THE FLAT. PAPER KNIFE HANDLE DECORATED IN THE "VIKING" OR "DRAGON" STYLE.

of almost any size to be securely and firmly fixed; the screw through the head of one of the bolts affording means of at once releasing or tightening the work.

With our modest kitchen table and coach-maker's clamps—which are all that is necessary, at least for carving small articles—we will dispense with all these appliances.

III. PRELIMINARY PRACTICE—CARE OF TOOLS.

Take a board of common pine, about 16 in. long, 10 in. wide, and 1 in. thick, and fasten it firmly to your table by means of the clamps. Rule a few straight lines from end to end of the board $\frac{3}{8}$ in. apart. Take the hollow gouge and hollow these spaces out, holding the handle of

will meet with more resistance; but after a few trials you will succeed.

Now turn the board over, make a few circles, and gouge them out around the outside edge. This will be more difficult still, but from this practice you will soon become familiar with the use of the gouge.

By this time it will have lost something of its sharpness, and it will not be out of place to give here a few hints about

Grinding and Setting Tools.—Chisels are ground on both sides to a long, thin wedge—that is to say, about a quarter of an inch of the flat surface is bevelled toward the cutting edge. Gouges are held to the grindstone at an angle to make a bevel of about a quarter of an inch on the convex side, on which side they are always ground. This is perhaps the most

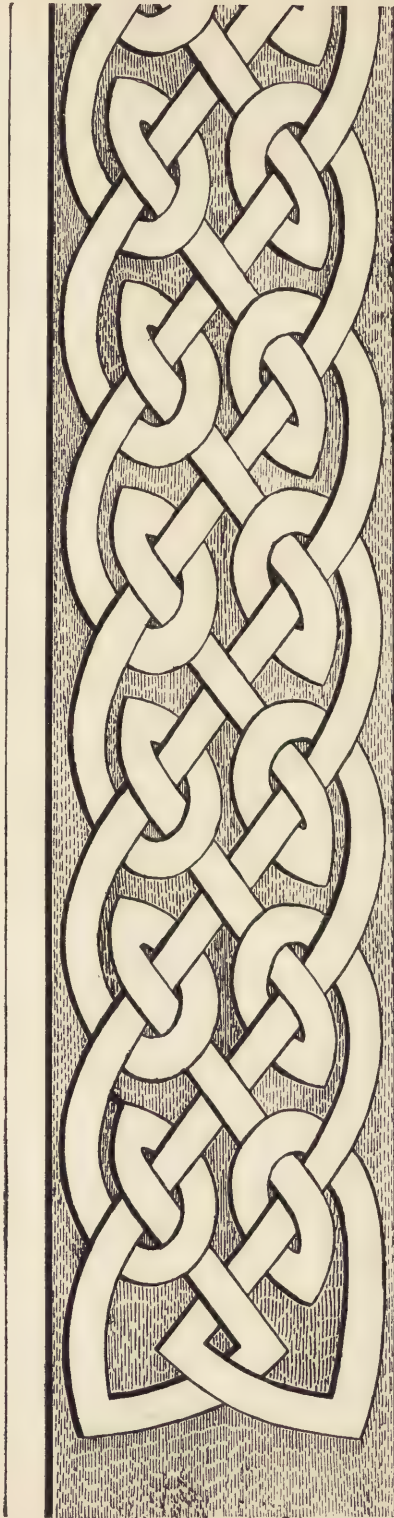
awkward task for beginners. To sharpen a gouge properly requires much care and practice, as a gouge correctly sharpened should have a perfect curve.

The line formed by the cutting edge, as well as the bevel, should be carefully preserved. To secure this the tool should be constantly turned from side to side while grinding, without being lifted during the process. The tools are now given their keen cutting edge by gently rubbing them backward and forward on the oil-stone at the same angle at which the tool is ground. Do not press too hard, or you will have a jagged edge like a saw. In setting tools you should turn them first one way and then reverse them between the fingers and thumb as they pass along the stone. Do not rub the gouges on the inside with the stone, unless it is to remove a jagged edge. Even then great care must be taken, and the stone should perfectly fit the concave side of the tool. It is not advisable for beginners to grind their own tools. If they are obtained in good condition they can be easily kept so, with a little attention and care. Tools only require to be ground when they become very blunt or broken. Take good care that the edges of your tools do not rub against each other. They should be always laid parallel, whether in use or not. After using the oil-stone wipe it well with a rag or shaving, to free it from grease.

IV. SURFACE DECORATION.

In surface-carving, or "carving in the flat," the design is merely outlined, not modelled. Perhaps the most artistic kind of surface-carving is that done, after the fashion of the old Norsemen, in the "Dragon"¹ or "Viking" style.

¹ The first name refers to the most characteristic motive of the Norse designs, which is a much conventionalised writhing serpent with a dragon-like head; or rather we might say a series of such serpents inextricably combined to form a sort of strap pattern. The second name is due to the fact that the Norse Vikings made elaborate use of this kind of decoration—on the garments of their women and in their domestic surroundings, as well as on their ships and arms.



DESIGN 90.—CARVING IN THE FLAT. OLD CELTIC
"STRAP WORK."

As the beauty of a design of this sort depends chiefly on the perfection of the outline, you cannot be too careful in the drawing.

Having made the design on paper, transfer it to the wood. To do this, place it in the exact position it is to occupy on the panel, and under it put a sheet of black transfer-paper; then with the pencil, or a dull ivory point, or, better still, an agate stylus, go carefully over every line of the design, and, according to the accuracy with which the tracing is made, the outline will be transferred to the wood.

Take your smallest-sized veining or V tool, and follow the outline very carefully all around the design; make a clean cut, uniform in depth and width, following the line as accurately and as closely as you can without destroying it. Afterward go over this groove outline and deepen it; then, with a flat gouge follow the sharp edges left on the background by the veining tool and smooth them into the background. To give contrast between the pattern and the background—for there will be no variation in the relief—stamp the background with a fine stamp. Under ordinary circumstances we do not advise the use of the stamping tool, for it renders wood-carving too mechanical; but in such a case as this it seems to be necessary.

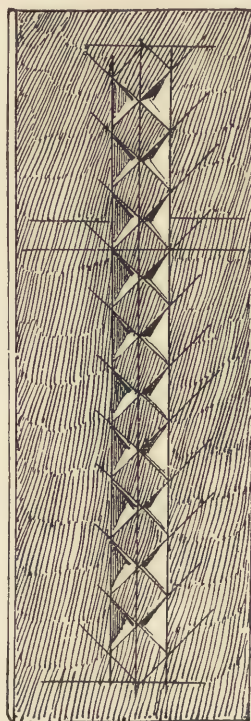
Having finished the stamping, take up the flat gouge again to represent the intersecting portions of the design, which is done by sloping the parts that run under down toward the parts that are to be represented as crossing them.

Rulers, paper-knives, and tea-trays are usually the first things decorated in the "Viking" style; as in this kind of carving there are no projections of relief to split off, it is particularly suitable for the decoration of any articles of furniture subject to much contact with the person.

Surface-carving may be used on woods after they have received their finish, as for the decoration of work-boxes, handkerchief-boxes and glove-boxes, chairs and small table-tops, photograph-frames, book-racks and footstools.

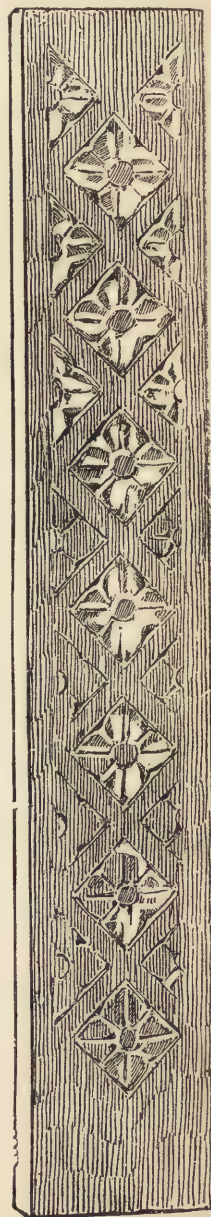
V. RELIEF-CARVING.

The general and perhaps most artistic method of carving is in such relief that the design, when completed, appears wholly raised above the



DESIGN 91.—SIMPLE EXERCISE FOR A BEGINNER.

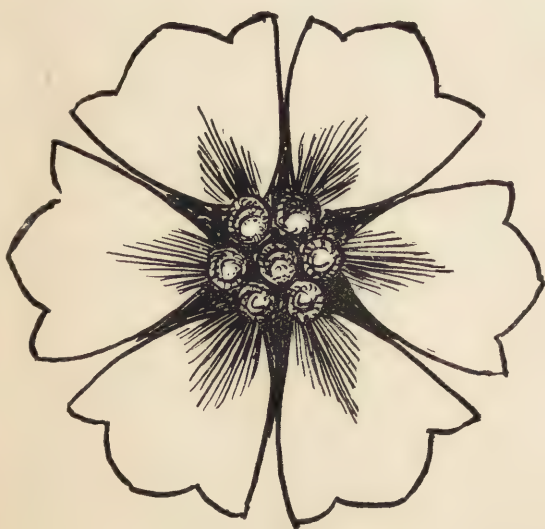
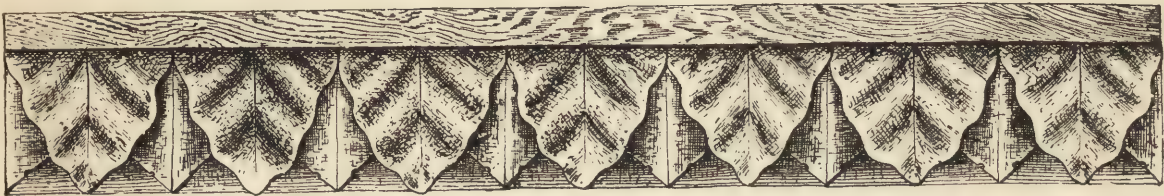
Make the diamonds 1 in. square. (See p. 30.)



DESIGN 92.—SIMPLE EXERCISE FOR A BEGINNER.

Make the diamonds 2 in. square, and the plain bands $\frac{1}{2}$ in. wide. (See p. 32.)

"ground," the background having been lowered or cut away to a uniform depth. Transfer the design carefully. In order to cut away the background, the dead wood must be separated from the pattern edges. Take a gouge and go around the outside of the design $\frac{1}{8}$ in. away from the lines, cutting carefully with the grain, say $\frac{3}{8}$ in. in depth, and being very careful the gouge does not slip,



DESIGNS 93-97.—ROSETTES AND SIMPLE BAND OF DECORATION FOR WOOD-CARVING.

as it may cut away a portion of the design. This gouging or trenching is to allow the background to break away easily when you are stabbing out, or, as it is properly termed, "kurfig," the pattern. If this trenching is not done, the design is liable to break away before the background. Next take a flat chisel and "kurf" the design out all around in a continuous line, sloping the chisel at a slight angle (see fig. 208) and driving it with the mallet toward the groove you have previously cut. In releasing the tool, move it from end to end sidewise, not flatwise, as you are liable to break the tool. Sharp curves should be "kurfed" with the gouge, or any of the tools that will fit the exact form of the line to be cut.

Now to remove the background. This is called "grounding," or cutting away the dead wood. Take the flat gouge and remove the wood. The corners and sharp angles can be cleared away with the skew chisel. Do not splinter your wood; do not dig it, but take it off in clean *cuts*. Try always to cut with the grain, making it smooth and level.

After the background has been removed, go over the whole design, cutting those parts under which are overlapped.

The work is now in condition to be modelled. Do not attempt to finish any one part. Study the whole design carefully. Supposing that it is one of flowers and foliage, cut under all those parts that are concealed by others. Give to each the depression it will have in the finished work. Each part should be cleanly cut with one stroke of the tool, leaving the permanent form nicely smoothed before it is veined.

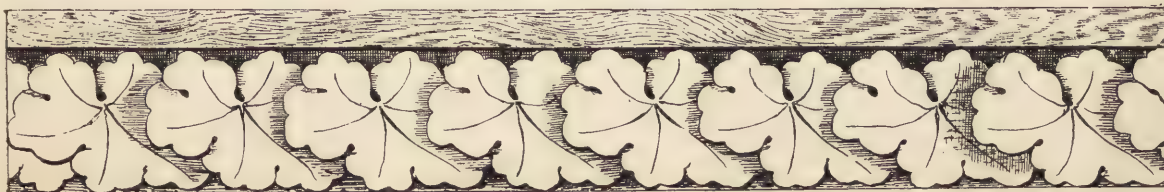
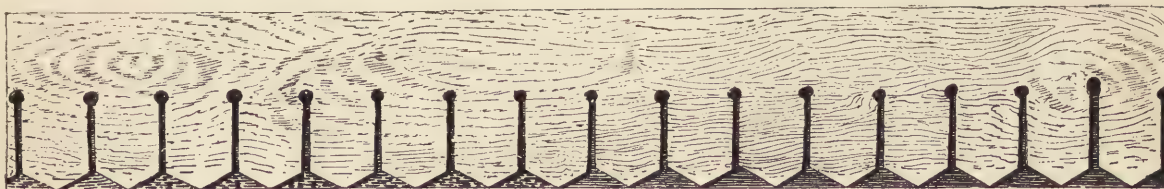
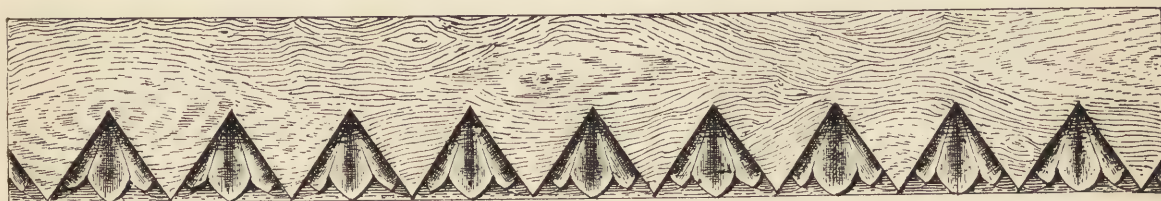
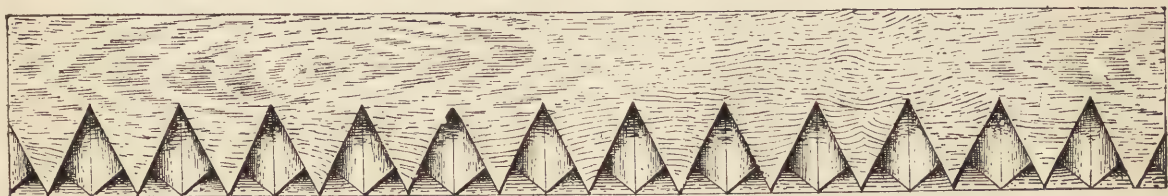
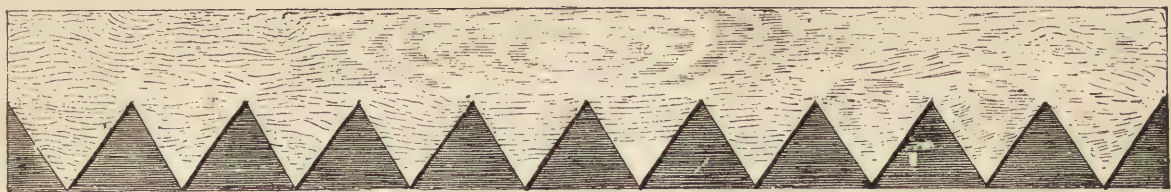
Trim down the stems to their proper size; see that they are neatly attached to the leaves; finish all the stronger parts first, leaving all little stems till the last, as they are liable to be knocked off; smooth up the work with a well-sharpened tool, and it is then ready to receive the finish.

Two very simple exercises for beginners are shown on page 38. In the first we have a simple band of bevelled points, leaving a row of diamonds in the centre. Take a narrow chisel

and hold it vertically, setting it at the inside point of the level; cut straight down to an equal depth on each side, sloping to the outside edge. Then holding the chisel in the position shown in fig. 207, cut from the outside edge down to the centre. To cut the point clean, use your narrow bevelled chisel. Always work with the bevelled side of the chisel down, and be careful to hold it flat on this bevel; otherwise you will wear it off round. Try to cut with a firm, even stroke. One cut is better than two, if it will do the work.

In design 92 we have an example in which the conventionalised flower forms require slight modelling. Get the centre of the diamond and, holding the medium gouge straight and turning it once, cut the "boss" in the centre of the figure. Outline the petals with the flat gouge, setting the tool at the point where the petals join, and cutting to the outside point. The width and the sweep of the tool with a little handling will give the outline required. With the chisel bevel around the edges deep enough to get an effect of light and shade. Make the straight cut indicated in the middle of each petal with the V tool, cutting toward the boss, and making the cut deepest at the centre. Model the flower with one cut on each half-petal with the medium gouge. Round slightly the sharp edges of the boss in the centre. Draw the diamonds two inches square and the plain bands half an inch wide.

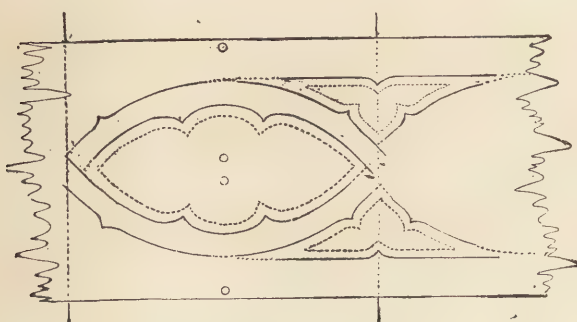
Finishing is best done with raw linseed oil applied with a bristle brush, as much being used as the wood will absorb. Three or four coats will be needed as a rule. The pattern may be polished by brisk but careful and oft-repeated rubbing with a stick of soft wood. Beeswax is often used for polishing, although we think that the more artistic way is to depend solely on the dull finish obtained by means of oil alone. Even more than the use of wax polish on carving do we deprecate that of varnish of any kind, for it is a poor substitute for the natural "patina" which comes from age and wear, the process of which is arrested by a covering of varnish. But for the benefit of dissenters from this view we give the following



DESIGNS 98-104.—EDGINGS AND MOULDINGS FOR WOOD-CARVING.

directions for shellac finishing, by an expert carver who finds it proper to use it.

Polishing.—"To polish flat surfaces, such as table-tops, the wood must be well rubbed with No. 0 sandpaper, and all knot-holes and flaws must be stopped with wax. The wood is then filled with 'patent wood-filler,' which is first thinned down with turpentine to the con-



DESIGN 105.—MOULD FOR MARKING OFF THE DESIGN SHOWN BELOW.

sistency of cream. Rub it in with a rag or a little bunch of excelsior shavings. In a few minutes the pores will be closed, and the surface of the wood may be rubbed freely without rubbing away any of the filler in them.

"Put the wood aside until the next day; then give it a coat of shellac varnish, and put the wood aside again for a few hours to harden. When it is hard, rub it well with No. 0 sandpaper until it is perfectly smooth.

"The final polish is given with a 'rubber,' which consists of a small ball of cotton-batting

it on the mouth of the bottle, throwing the solution toward it two or three times. In the middle of the varnish on the rag, place with your finger a little raw linseed-oil. Rub with small circular strokes until all the pores are filled, charging the rubber with varnish and oil when required, until the whole surface has had one coat. When this is quite dry, repeat the process until the surface appears even and fine. Between each coat use the sandpaper to smooth down all irregularities. Lastly, use a clean rubber, with a little wood alcohol only, which will remove the oil and the cloudings it causes. Should the work become sticky and rough at any stage of the process, this can be overcome by touching the surface here and there with a little oil, which you should have near you in a saucer, so that you may dip a finger of the left hand into it, repeating the process when needed. This is merely to facilitate the spreading of the varnish smoothly."

Stamped Backgrounds.—As has been already observed, stamping backgrounds, in our opinion, gives too mechanical a look to wood-carving in relief for it to be considered an artistic finish; but as some carvers are not of our way of thinking, we must not ignore a process which many amateurs find attractive and use extensively. So, if you choose, having finished your modelling, complete the work by stamping the background. For any design of fair size, use the largest stamp you have—the smaller ones are for small spaces; set the stamp, and



DESIGN 105A.—CARVED GOTHIC DADO RAIL. EASY LESSON FOR A BEGINNER.

covered with a piece of soft linen rag, wrapped so as to leave a handle at the back for the hand. Partly saturate the rubber by placing

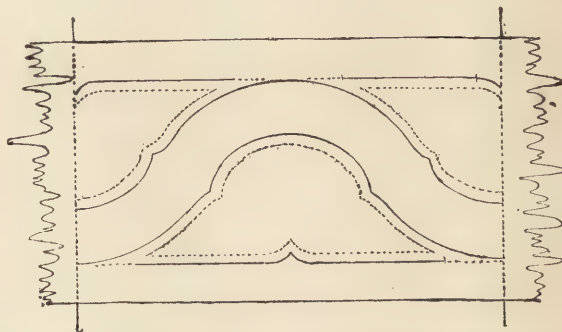
strike it lightly with the mallet. Keep turning the stamp so that its square shape will not show on the wood. The object of stamping is

to get a fine-grained effect. When the grain of the wood is broken it absorbs the oil more readily, and makes a background darker than the design. This, with the different texture it gives the wood, throws the design into still higher relief. Coarse stamping is more effective than fine.

A Gothic Dado Rail.—One who has never done actual cutting in wood and who has doubt as to his ability to produce anything creditable in this way, might, in many cases, be induced to make a trial, were some specific work of a simple character suggested to him for a beginning, and which, if successful, could be a noticeable feature in the decoration of his home. Such an occasion for a first attempt is easily found. In most houses there are one or more rooms in which the walls, whether painted or papered, are divided into dado and frieze, the latter varying from twelve to thirty inches in width, according to the height of the room. Let this division line between the two wall colours be emphasised into a line of decoration. Instead of the usual painted band, or machine-made moulding, let the division be marked with a striking line of hand-carving. It may be of cherry, black walnut, or oak, and two and a half or three inches wide. The finished result will be more satisfactory if the wood is polished on the face and lower edge before the carving is begun. The upper edge of the strip should be rebated toward the back, to afford a hold for hooks, from which pictures might hang. These strips, which any

wall by means of eightpenny finishing nails, driven into the studding through the lowered portions of the carving; by doing this the heads of the nails will not be seen.

Two rooms, in which a carved frieze-band of cherry wood was introduced, are in the mind of the present writer; the added beauty secured by this simple decoration won the approval of



DESIGN 106.—MOULD FOR MARKING OFF THE DESIGN SHOWN BELOW.

all who saw it. The designs consisted of easily cut patterns of Gothic tracery, of which we give illustrations.

To facilitate marking off a design for carving, where a given form is many times repeated, it is customary to make a *mould* of cardboard by means of which the design is readily and accurately transferred to the wood (designs 105 and 106). The design, after being drawn on the card, is cut through with a sharp knife, a gouge of the proper sweep, where possible, being used to cut the curves. When the lines



DESIGN 106A.—CARVED GOTHIC DADO RAIL. EASY LESSON FOR A BEGINNER.

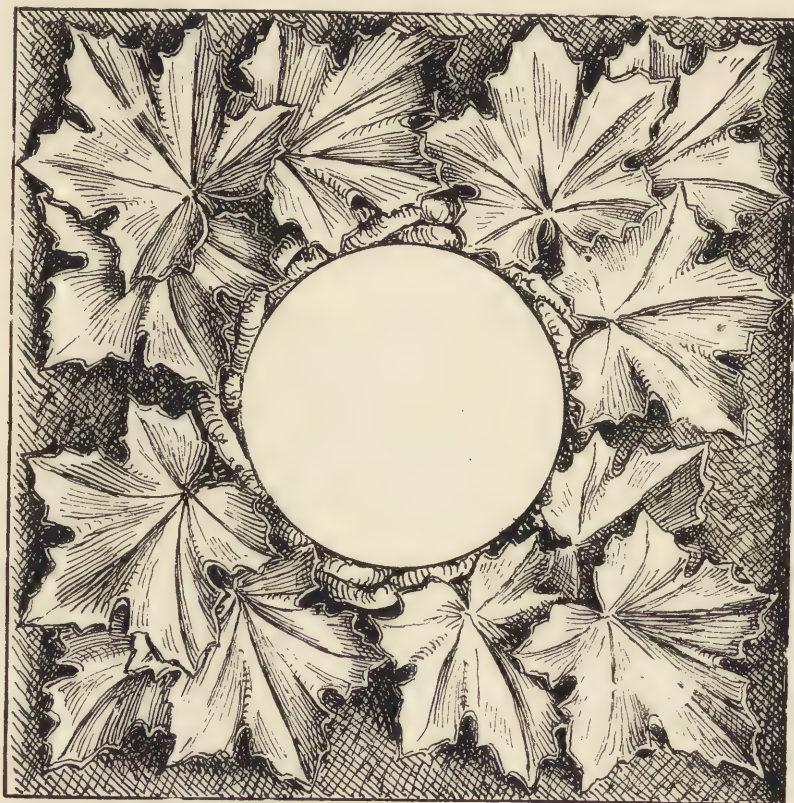
carpenter could prepare, should be cut to the proper lengths, to fit, before they are carved. When carved they should be secured to the

are cut through the card, they must be opened and widened, so that a sharp-pointed pencil will mark through the cut line to the wood.

This can be done by placing the mould upon any smooth surface and pressing a dull point or tracer through the line. If, before using, the edges are painted with shellac varnish, the mould will be strengthened, and probably last double the time it would if this were not done. Above each of the simple Gothic designs illustrated herewith is a diagram of the mould for marking it off. The centres from which the

wood,—this, of course, will not avail if it is unpolished.

In laying off this design, first make vertical lines with a T square, three inches apart, which will be the guide for placing the mould in the exact position. A mould to mark off a strip or border of a given width should always be made with a doubled-over edge, of, say, half an inch in width, to serve as a gauge



DESIGN 107.—WOOD-CARVING. WATCH STAND.

larger curves are struck are indicated, leaving the quicker curves of the cusps to be drawn by hand. The lines of the mould which are to be cut through are indicated by an unbroken line; the dotted lines must *not* be cut, otherwise the mould would drop into pieces, but are to be put in by freehand drawing. If the wood is polished, and the amateur doubts his ability to draw these parallel lines with accuracy, the dotted lines may be pricked through to the

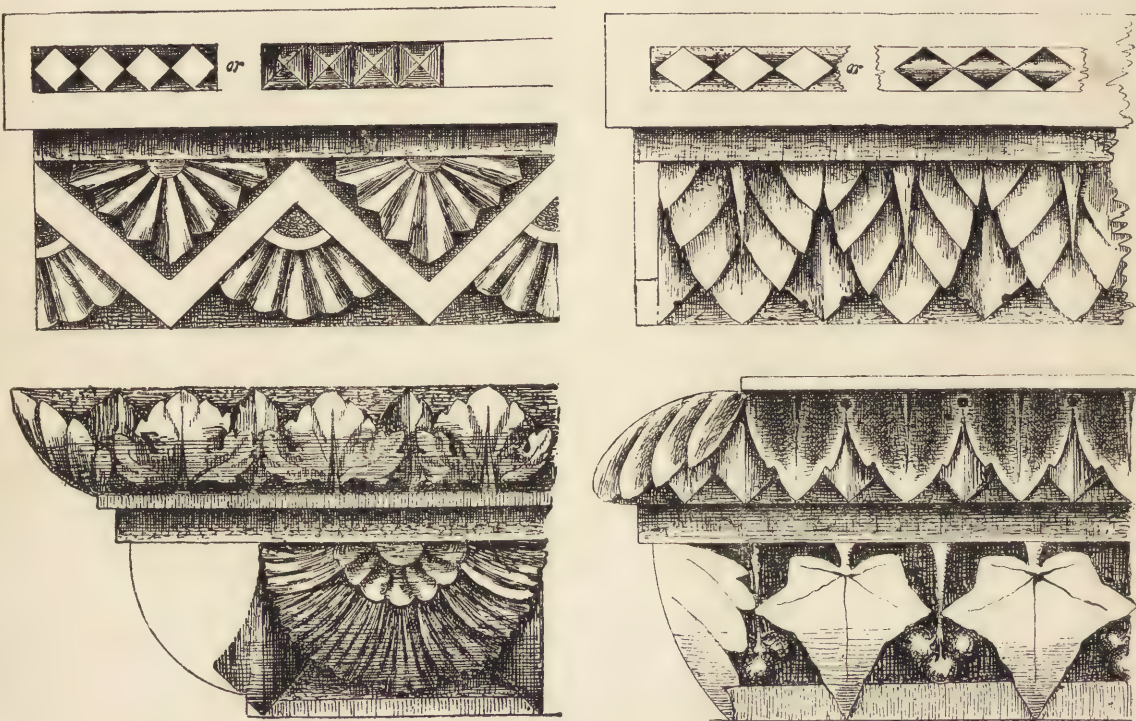
or guide, and which, sliding along the edge of the strip, secures uniformity in marking the design.

Lower the portions within the dotted lines a quarter of an inch, and stamp the background with a coarse stamp. The edges of all bands in Gothic tracery are finished with a hollow chamfer, as shown in the illustrations, and indicated by the dotted line of the moulds.

Edges of Shelves admit of varied treatment. Fig. 211 shows a square-edged shelf, with a one-and-a-half-inch supporting rail. A lozenge or square diamond, or a dog-tooth, is simple and appropriate decoration for a square-edged shelf. The rail admits of varied conventional decoration, as in figs. 211 and 213. The edge of the shelf should vary in form according to the position it occupies; that is, whether above or below the eye. If the square edge is not

case the execution of the carving requires more care, but the added effect is well worth the extra trouble.

One of the most useful and inexpensive articles of furniture—admitting, at the same time, of fine and varied decoration—is a set of hanging shelves, suitable for books, dining-room service, or for *bric-à-brac*. It may be made in the simplest manner, and it admits of almost any degree of elaboration, both in construction



FIGS. 211-214.—EDGES OF SHELVES TO BE PLACED RESPECTIVELY ABOVE AND BELOW THE EYE.

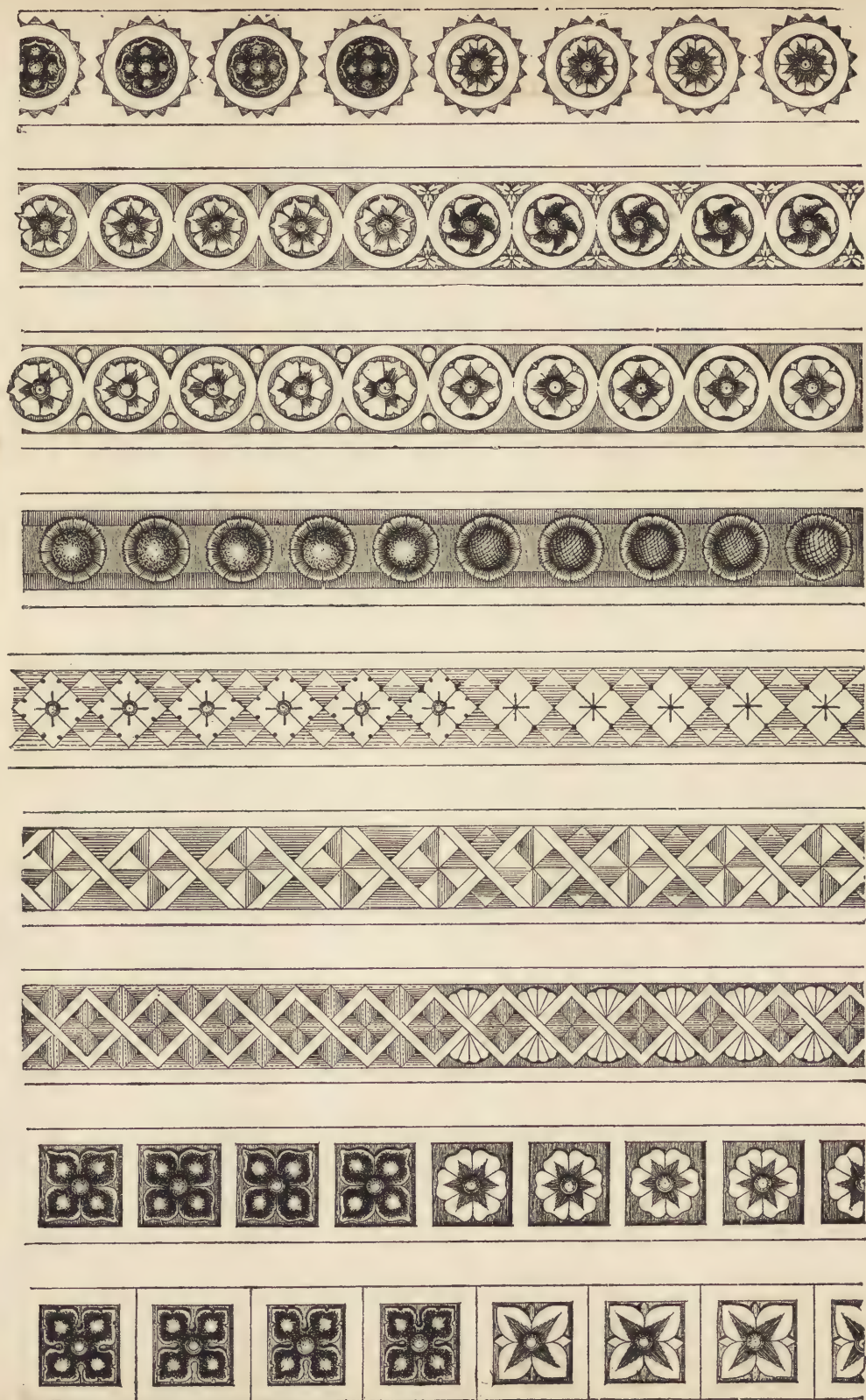
used, it should be moulded as in fig. 212 when *above* the eye, and like fig. 214 when *below* the eye. In every case the rail should be set back at least a quarter of an inch from the face of the shelf, and the edge of the shelf should be recessed a like distance from the front edge of the sides. The edges of shelves should not be modelled, but carved with surface treatment when in a position to catch the dust.

The supporting rails may be left with a square face, as in figs. 211 and 213, or they may be moulded, as in figs. 212 and 214. In the latter

and decoration. Black walnut, cherry, or oak may be used. The carved parts should not be stained, but simply brushed over with raw linseed-oil.

There is a point in the construction of hanging shelves which should not be overlooked: the cabinet-maker should invariably be directed to dovetail all the shelves into the sides.

The decoration of the sides should be selected with reference to its general effect, and, while appropriate and striking, should be subordinate to the face decoration.

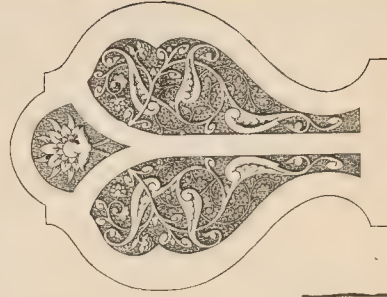


DESIGNS 108-116.—BANDS OF DECORATION FOR WOOD-CARVING. TO BE APPLIED EITHER VERTICALLY OR HORIZONTALLY.

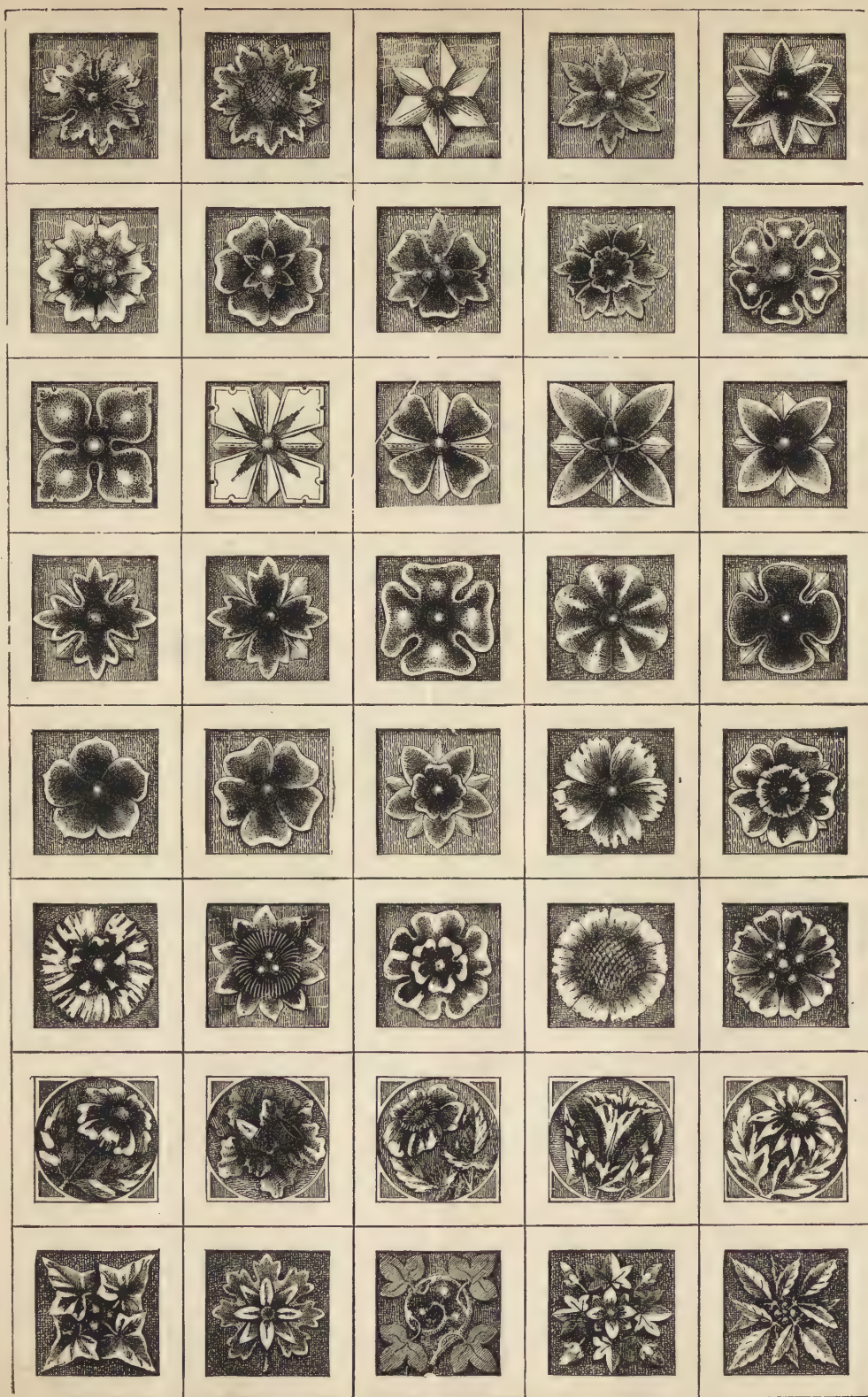
Plate F.—Full-size Design for
Wood-Carving or Pyrogravure.



Decoration for a
Chair Back.

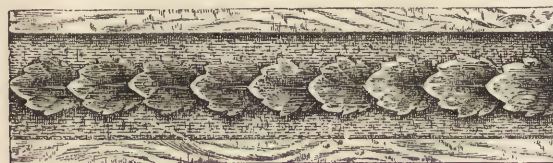


Back of
Foldout
Not Imaged



DESIGNS 117-156.—ROSETTES AND OTHER DECORATIONS FOR WOOD-CARVING.

Diaper designs are often used for the decoration of such objects as cabinets and book-shelves; for the back panels of open shelves,



DESIGNS 157-162.—SIMPLE BANDS OF DECORATION FOR WOOD-CARVING.

the sides or ends of caskets, book-racks, and other places of *secondary* importance, the more

prominent spaces and panels being reserved for decoration of more character. The simplest and most useful diaper¹ is formed from a square. This may be used in an upright and in a diagonal position, as in Nos. 163 to 172. A diaper may be made with (No. 165) or without (No. 164) an intervening band. When a diaper design is carved without a band—a favourite form with the old Gothic architects—a distinctly incised line should mark the division. Where the diaper is one, or one-and-a-quarter inches square, the incised line should not exceed one-eighth of an inch; if smaller the width of the incision should be correspondingly diminished.

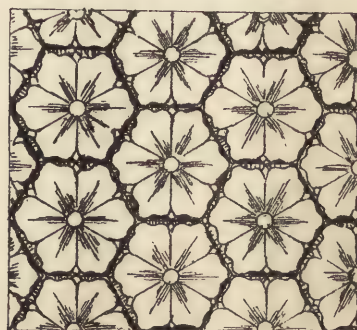
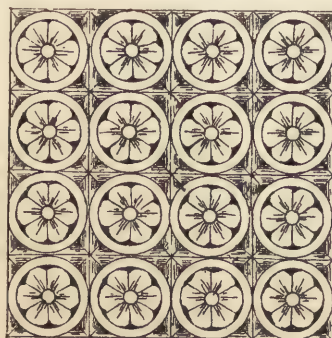
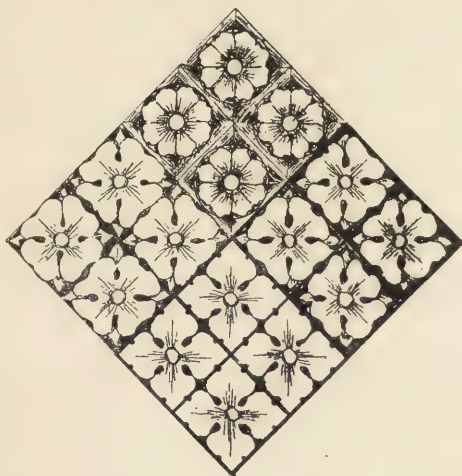
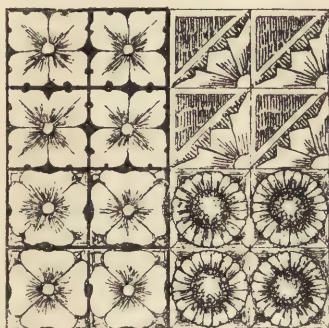
Another variety of diaper is obtained by doubling the band, in which case each rosette has its own complete border, as shown in Nos. 166 and 168. The band, whether single or double, may be interlaced, wicker-work fashion, as in No. 177. Among further variations shown in our illustrations are the alternating of one rosette with another of quite different form, alternating a rosette and leaf, and alternating the front view of a flower with its profile or side view (Nos. 165, 175).

Diaper work may be made to include designs other than those of uniform divisions, an example of which is shown in design 163, where the arc of a circle, springing from a base line, then reversing and crossing with a succession of the same arc, gives pointed arches, diminishing in size and varying in shape toward the top.

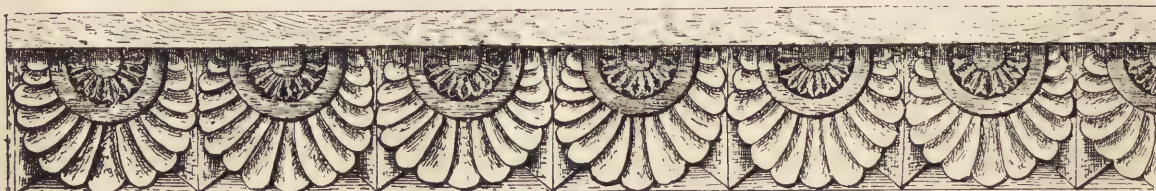
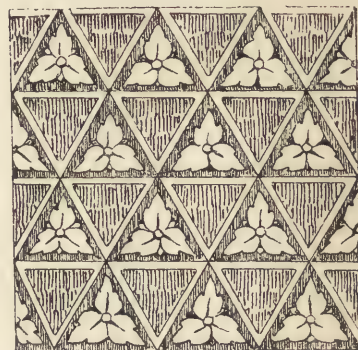
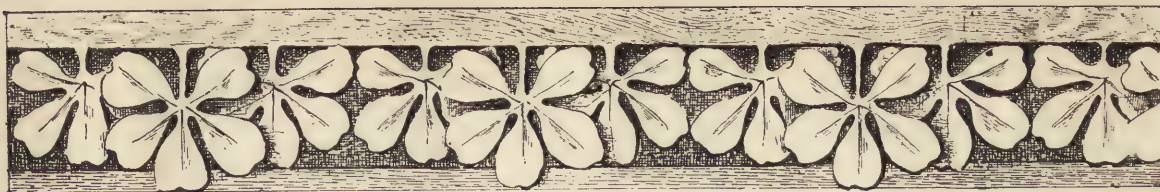
A design of this order may be used with excellent effect for the back panels of *bric-à-brac*, or other open shelves where surface carving only is required.

The combined designs, Nos. 165 and 167, of course, are not intended to be used as they are shown here. It is only intended to indicate, in a restricted space, how great is the variety of motives at command for this simple method of ornamentation.

¹ The term diaper is said to be a perversion of the word Ypres, a town in Belgium, whence the method of applying, to a certain kind of fabric, designs made up "all over" geometrical patterns was first introduced into England, in the Middle Ages.



DESIGNS 163-172.—
DIAPER TREATMENTS FOR WOOD-CARVING
(SEE P. 48.)



DESIGNS 173-180.—EDGES, MOULDINGS, AND DIAPER PATTERNS FOR WOOD-CARVING.

VI. CARVING IN THE ROUND.

The wood for small articles should be close grained and well seasoned, every possible precaution being necessary to guard against splintering, or warping through variation of temperature or from moisture. Lancewood is excellent for the purpose, being uniform in grain, tough and elastic. It would be equally good for the carved spoon (No. 187) and the one decorated with fret-work (No. 188); about the latter process we shall speak presently.

A piece of lancewood eight and a half inches long, two inches wide, and two and a half inches thick, if properly managed, will cut into two spoons. It should be planed and smoothed on both sides.

The front view of the bowl and the shape of the handle should be traced on both sides of the wood, so that there is a bowl at each opposite end. The bowl is one inch deep, and should be the first part of the work considered. The wood, being flat on both sides, can be securely held under the clamps. The making of the bowl being the heaviest part of the work, it is necessary that this part in particular should be fastened down firmly. With a half-inch curved gouge cut away the wood from right to left and left to right, removing very little wood at a time, until you have sunk the bowl to the desired depth. Then with a straight, wide, curved gouge cut away the sides. Great care must be taken not to splinter or split the wood. Such a defect, however slight, will show when you thin down the reverse side. A blemish in the bowl will make it practically worthless, as it is likely to split apart altogether. Clean out the shape as smoothly as you can with any tools that are handiest, care being taken to keep the bottom uniform, avoiding hills and holes. The final smoothing can be done with a bent riddle file and glass-paper secured to the end of a stick; the scratches can be removed with a cabinet-maker's half-round moulding scraper.

The bowls being finished, the spoons are sawn apart. The block of wood should be held by its middle in a vice. Saw half way through; turn it round and saw the other half.

A good deal of the shaping of the outside of the bowl may be done with the saw, care being taken not to saw too close. The work must be held by the handle, which should be left rather thick.

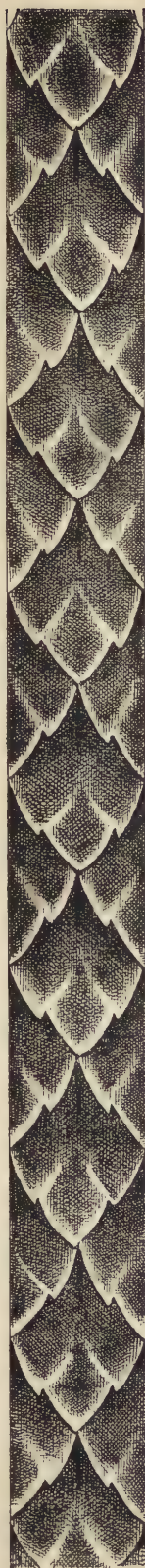
With an eight-inch half-round rasp, the work may be speedily shaped. Care must be taken not to carry this operation too far; as the wood thins it will be found too severe.

The fret-sawn handle should be rasped down to about three-sixteenths of an inch, or less, according to the size of the spoon and con-



DESIGN 181.—ARMCHAIR, CARVED WHOLLY BY AN AMATEUR.

dition of the wood. The whole is now ready to be glass-papered and scraped. The operation of fret-sawing will be described presently (see



DESIGNS 182-185.—VERTICAL OR HORIZONTAL BANDS OF DECORATION FOR WOOD-CARVING.

p. 56) with particular reference to its application to the decoration of small articles of furniture; but fret-work is frequently used in conjunction

To return to No. 188, the design should now be drawn on the back of the handle. We say on the back, because while piercing the design the



DESIGN 186.—WOOD-CARVING. END OF A LIBRARY STOOL.

with wood-carving, and for our present purpose it would seem desirable to anticipate some part of these directions.

bowl would not allow the work to lie flat on the fret-work "horse"—i.e., a piece of wood cut out in the form of a boot-jack, with a screw to

fasten it to the table, the two prongs projecting over the table.

The fret-work is done as follows :—The wood to be worked is laid on the horse. To saw out the design, holes must be drilled in the places to be taken out of the interior; the saw is loosened at the bottom, put through the hole and refastened, and so on until all the pieces to come out of the centre are fretted. The saw is worked in a perpendicular manner, the right hand grasping the handle underneath the horse and worked up and down between the two prongs. The left hand is laid on the work to guide it, according to the lines to be sawn.

The shape of the handle should now be sawn out. This was not done before, because it would have weakened the wood and would have made it less convenient to hold in the vice.

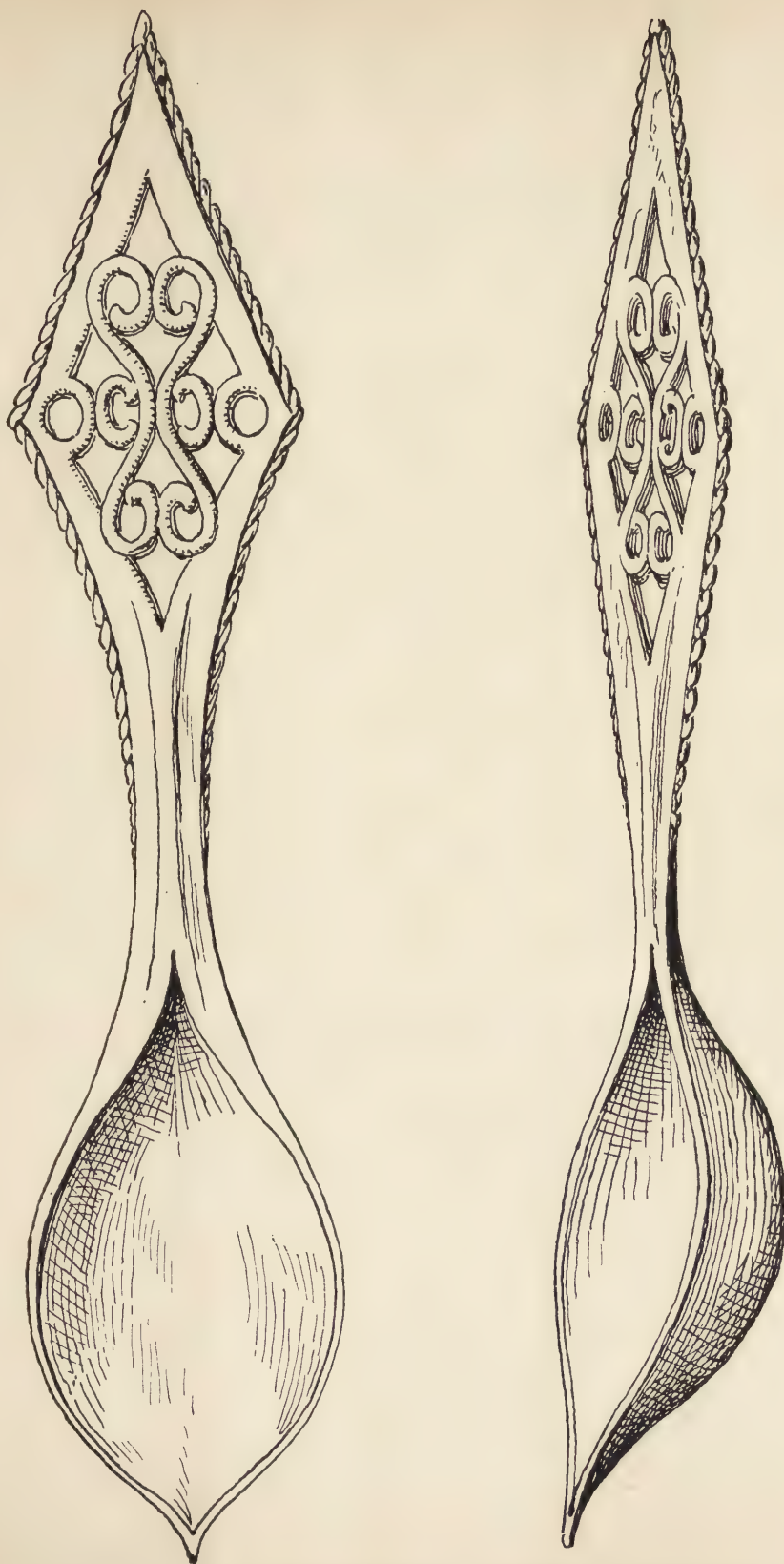
The beading round the handle should next be marked off, and shaped with a six-inch, half-round, smooth file. The lines to part the beading from the handle can be made with a parting or V tool; likewise the laps of the design. The whole should now be smoothed with 00 glass-paper, and polished. The polish is given by rubbing (burnishing) with a piece of ivory, bone or hard wood. Do not rub too hard, or you will mark the work; rub lightly and continually—the more rubbing the better the polish.

Should you require the handle of the spoon curved, it can be done by steaming. Wrap a piece of rag around the bowl to keep the moisture from it. Steam only the handle. Take a piece of board a little wider and longer than the spoon; nail a piece of lath crosswise where the curve of the handle should come on one piece of board; nail on the other board a piece where the end of the handle will come; place the spoon between the boards and clamp together; then put the spoon in a warm place to dry for about twenty-four hours or more, according to the density of the wood.

An amusing form of carving in the round is the decoration of the handle of a walking-stick with some grotesque head. A good plan is, first, to model the design in clay.



DESIGN 187.—WOOD-CARVING "IN THE ROUND."



DESIGN 183, 188A.—WOOD-CARVING "IN THE ROUND." A SHERBET SPOON.

FRET-SAWING.

IN the classification of topics in the present volume fret-sawing comes in naturally between Wood and Metal, it being common to both materials. When applied to the latter, however, it is called Saw Piercing, and that subject will be duly considered under the head of METAL WORK.

Fret-sawing in wood is a pleasant craft brought somewhat into disrepute through the ignorance with which it has been misapplied. In no kind of decoration is the distinction between pictures and ornament more needful to insist on than in this, and in none has it been more ignorantly ignored. Naturally treated human figures, birds, beasts, and fishes, and even portraiture and landscape, have been attempted in fret-cutting! We need hardly say that the only suitable designs for the purpose are such as are geometrical, or those in which natural forms are treated as purely conventional ornament.

Fret-cut panels inserted in ordinary joiners' work are, as a rule, more appropriate than articles made up wholly of fretwork; too much ornament defeats its own end, bewildering instead of pleasing. A few panels of good design, a well-placed moulding, or a little ornament emphasising the salient parts of an object, decorate it far more satisfactorily than would a medley of so-called ornament lavished on it without discrimination. Full-sized designs for fret-sawn panels are given herewith, and diagrams suggesting how they and similar ones may be applied to furniture. The ornaments being well protected, the feature of strength has been little regarded; but if they are to be executed in wood, it must be of the sort known as three-ply. As anything placed upon the shelf of a bracket must necessarily hide some part of a carved or otherwise decorated back, the ornament, as in fig. 218, is best restricted to the top.

Fret-work is rarely pleasing when polished. Walnut, oak, or other dark woods perhaps will be most suitable for such objects as are illustrated herewith, unless some light, closely-

grained wood—like birch, for instance—be selected and stained with transparent dye, such as the grass-green much seen in modern cabinet work.

All the tools¹ absolutely necessary for fret-sawing are a fret-saw frame, some saws, and a fine bradawl. In selecting your wood (walnut is the best), take care that it is of an even thickness and free from knots; for ordinary brackets and small frames one-eighth of an inch is thick enough; if thinner wood be used, extra care must be taken to see that it has no cracks or imperfections. With strong gum fix on your pattern carefully, with the grain of the wood running lengthwise. When it is quite dry begin by boring a hole in each of the white spaces in the pattern. Practice alone will teach you the best place to bore the holes so as to reduce the amount of sawing to a minimum.

Next, screw the end of the saw to which the teeth point into the clutch nearest the handle of your saw-frame, and carefully push the saw through one of the holes in your piece of wood. Then, pressing the handle of the frame against your chest and the top against the edge of the table, insert the loose end of the saw into the top clutch, and screw tight. If the saws are not stretched very tight they are liable to break. Now place the wood flat on the edge of the table, keeping it steady by pressing the left hand firmly upon it, and with the right hand saw carefully round the edge of the black pattern. It is better to begin with the inside space, and to leave the outside edge till the last. After taking out one piece carefully loosen the top clutch and insert the saw in the next hole, screwing up tight as before. When the whole pattern is cut out lay it in water with the paper side down, and the paper will come off; if this is carefully done it will be fit to use a second time.

Let your fret-work-dry in a press or under some heavy books, to prevent it warping. When it is quite dry polish or stain it.

¹ In the periodical *Design and Work* will be found advertisements of tools for all kinds of woodwork.

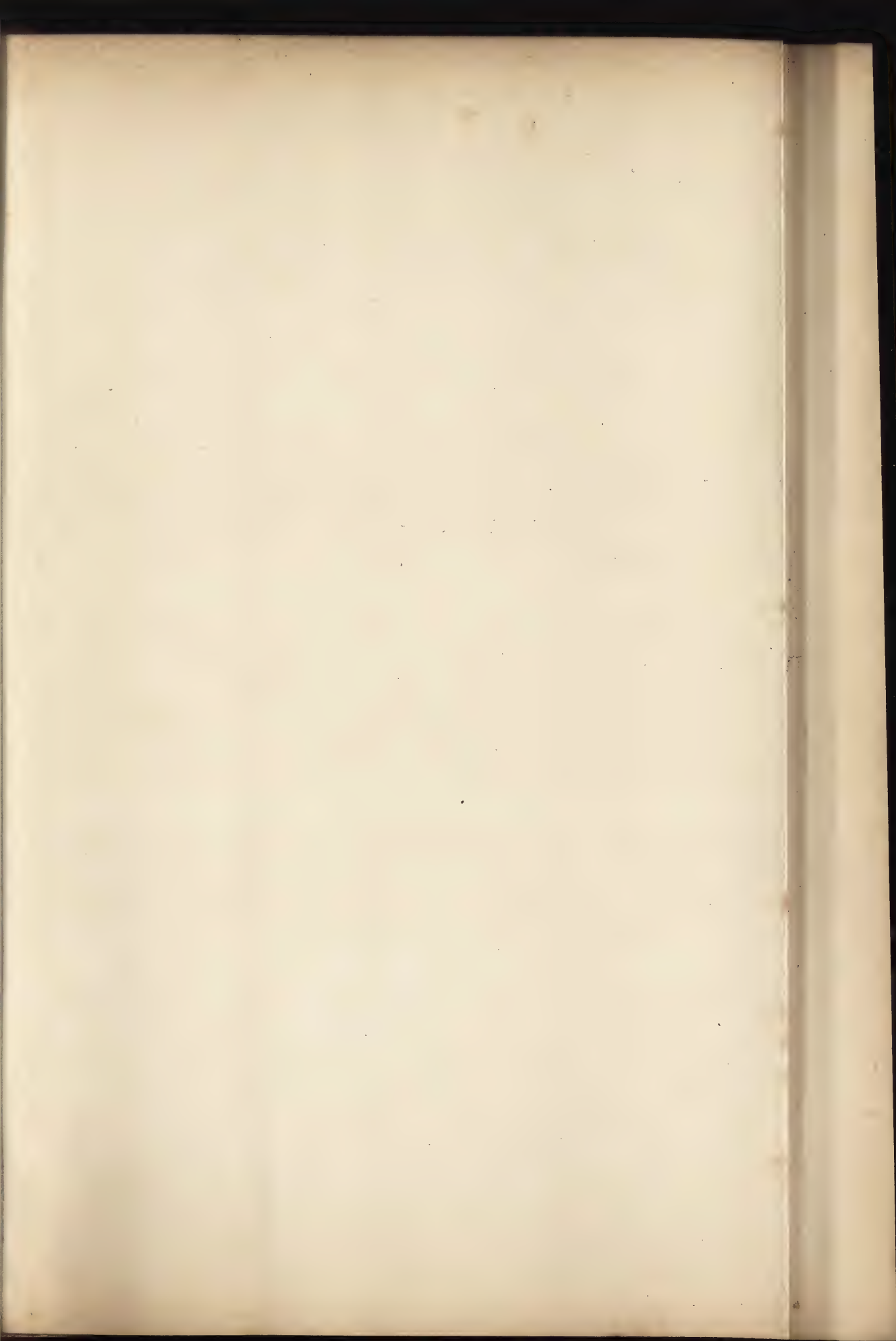
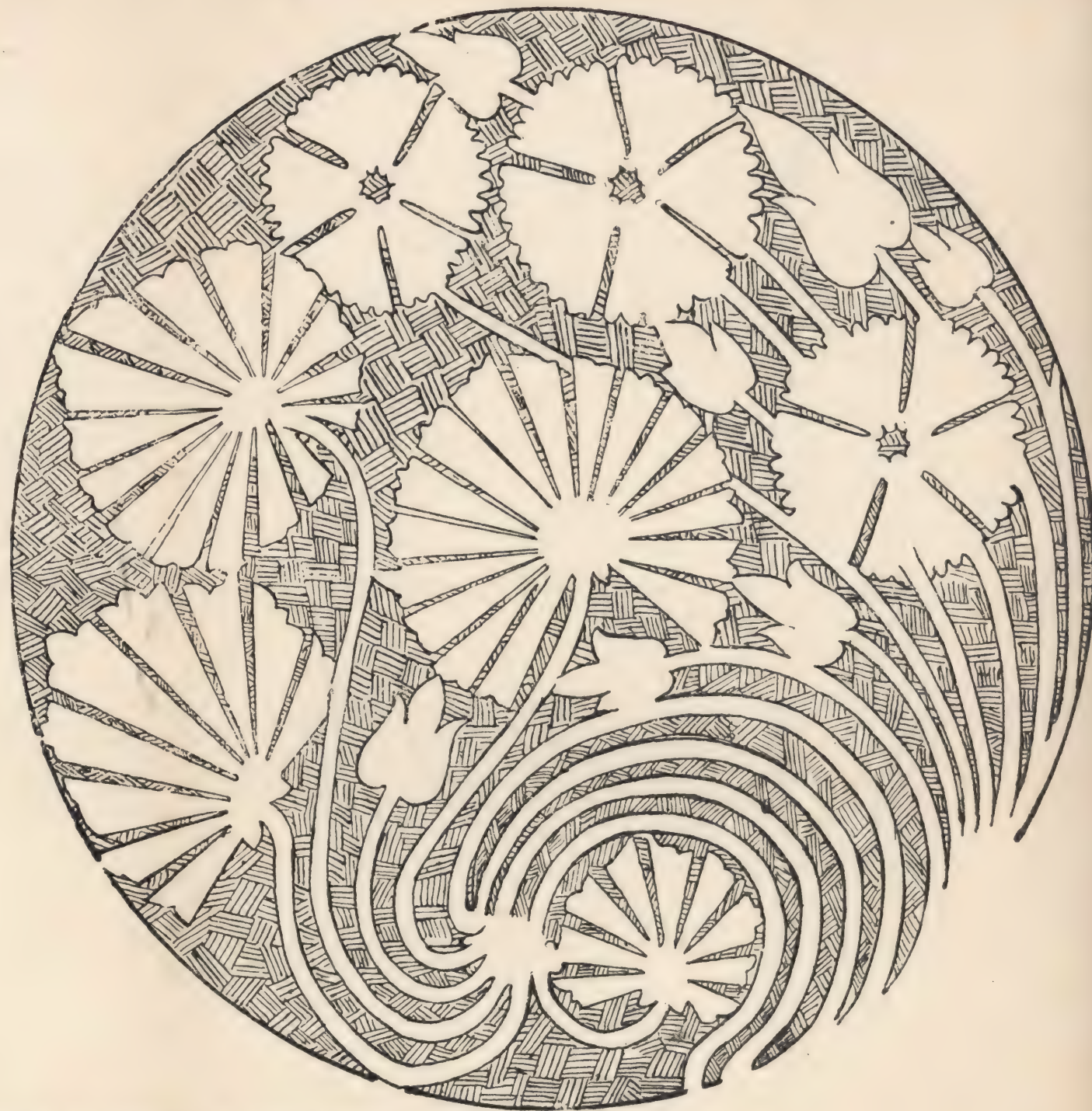


Plate G.—Full-size Fret-Saw Designs.



FRET-SAW PANELS FOR INSERTION IN SMALL ARTICLES OF FURNITURE. By GLEESON WHITE. (See page 57.)

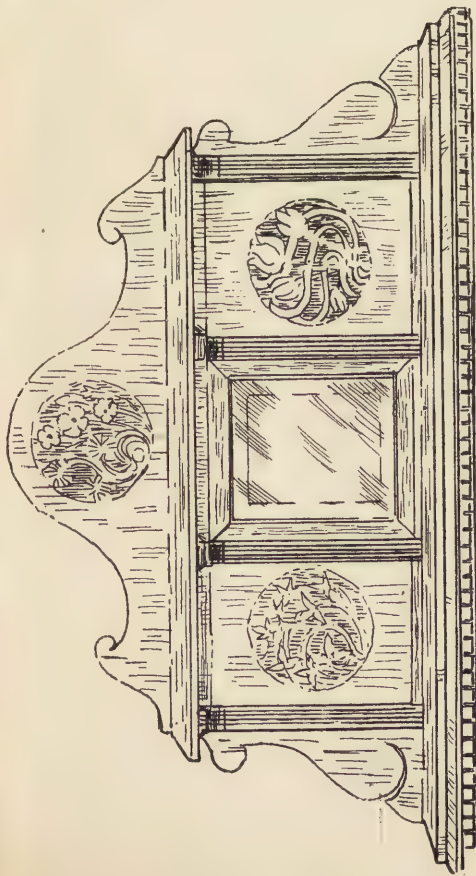


FIG. 215.—OVERMANTEL.

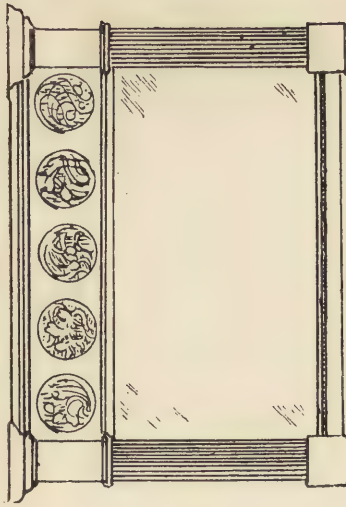


FIG. 216.—MANTEL MIRROR.

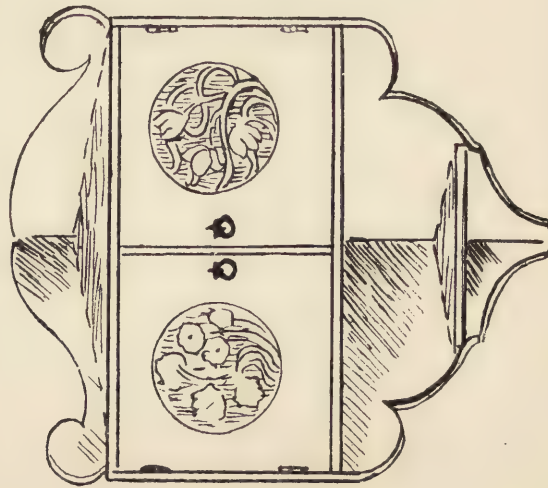


FIG. 217.—CORNER CABINET.

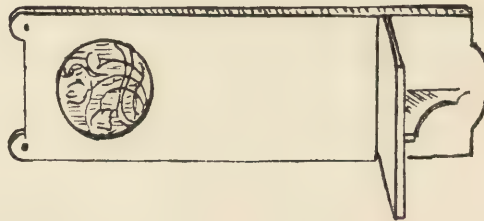


FIG. 218.—BRACKET.

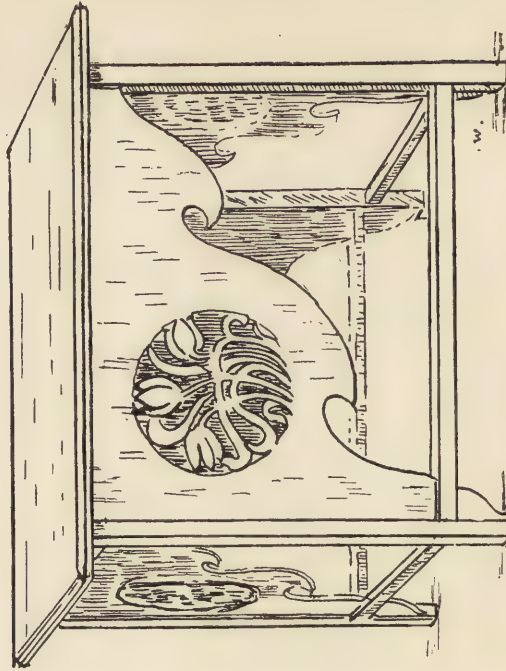


FIG. 219.—“OCCASIONAL” TABLE.

EXAMPLES OF INSERTION OF FRET-SAWN WORK IN SMALL ARTICLES OF FURNITURE.

PYROGRAVURE

(BURNT-WOOD ETCHING).

I. THE EVOLUTION OF "POKER WORK."

PYROGRAVURE (*i.e.* writing in fire), otherwise known as pyrography or burnt-wood etching, and also by the old-fashioned name "poker-

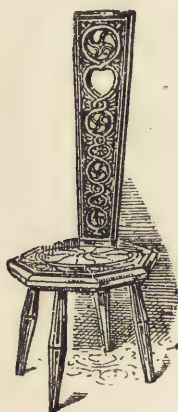


FIG. 220.
CHAIR DECORATED
IN PYROGRAVURE.

work," perhaps might be described under the head of "Drawing." It certainly *is* drawing—with the heated metal point on wood, leather, or glass, just as Etching and Drypoint are drawing with the needle or the burin on metal. Etching and Drypoint are so classified in this way in the present volume; but we must not confound the merely graphic with the decorative arts, and Pyrogravure is, properly speaking, Decoration. With the development of its technical

resources, through the application of the platinum point, artists and critics are agreed in placing it under the latter head, and so regarding it as a picturesque means of artistic expression. Hamerton enthusiastically speaks of pyrogravure as "a complete artist's process, full of technical qualities and satisfactions."

As has been said, it is a form of the old-fashioned "poker work." A small kitchen poker originally was the tool actually used. It was heated in an ordinary fire and then applied to the wood to be decorated, generally for outline work of broad design. Although, naturally, somewhat rudimentary in execution, the work in skilled hands was remarkably effective, especially when the background was sufficiently burnt away to show the design in low relief.

The first improvement on the humble domestic implement was a set of poker-like points of different sizes, made especially for this sort of work, but all retaining the family likeness to the dear old kitchen emblem.

With the smallest of these very fine lines could be made, and the iron could be heated in a spirit-lamp or gas-stove—certainly a much cleaner and handier method than that of resort to the open fire. But the great drawback remained, that the point could never be kept to an even heat: from the moment of taking it from the flame the process of cooling began, and hence the greatest difficulty was experienced in attempting to control the depth of the shading; and to obtain a flat, even tone required a great deal of practice, as well as technical ability. Still, the tool ploughing its way through the uneven fibre of the wood, and meeting with more opposition than it does from the platinum point, gives a rugged vigour and picturesqueness of effect not often achieved with the more modern implement. With the rounded platinum point you are too apt to get a certain uniform woolliness of line. Much of the charm of the art lies in the wonderful accidental quality of broken line work. If you perfect your instrument too much you lose this—unless, indeed, you have the touch of a genius, for a genius can work with any kind of a tool and work wonders.

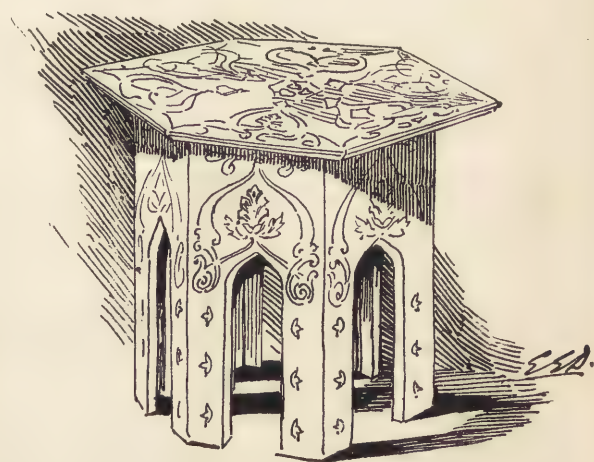


FIG. 221.—PYROGRAVURE DECORATION FOR A TABOURET
(see also P. 345).

Pyrogravure is rather slow work. It is more allied to etching than to painting. The artist goes over and over his work, as the etcher bites



DESIGN 189.—WOOD-CARVING OR PYROGRAVURE. PICTURE FRAME (VIRGINIA CREEPER), BY BENN PITMAN.



DESIGN 190.—FOR PYROGRAVURE. SUITABLE FOR THE TOP OF A BOX.

and rebites his plate. He deepens a tone here by reburning, or works it off with emery-cloth or sandpaper and reburns it. That is a little secret of technique which has not been told before.

Any tendency toward modelling or high relief should be repressed. Indeed, in all surface decoration the best effects are obtained by the use of flat tones in combination with graceful lines. Especially in this art should the accentuated line predominate, and finicky attempts at realistic detail be avoided.

The rich quality of old carved ivory may be given to a panel by burning the background and keeping the figures light; or, if you prefer, you may reverse the process, leaving the ground light.

II. TOOLS AND MATERIALS.

The platinum point is by far the most expensive item in the outfit of the pyrographer; for platinum ranks only second to gold in costliness. No other metal has its peculiar quality of absorbing the heat conveyed by the hydrocarbon vapour obtained from benzoline. The pattern attachments for set forms and borders, being hollow, cost about half as much as the solid points. The blunt point, which is the most useful, somewhat resembles in shape that of the ordinary poker. Fine lines can be got by using it lightly on the edge; for broad lines or shading it should be held in a less upright position, so that it may more quickly cover a broad surface.

The finer point of conical shape, a useful addition in any case, is almost indispensable for small or intricate designs. It would, however, be tedious to employ it alone even for such work, its special purpose being for fine, clear outlines. For covering broadly very large spaces, there is an attachment almost flat at the end, and about twice as thick as the ordinary tool.

The curved point is much liked, especially for backgrounds. It can be made to do duty for fine or broad work; for in coarse shading it can be applied to the wood on its rounded

side, while for even lines or dots the point only is brought into play. A great advantage of the curved point is that, on account of its shape, the body of the tool is kept at a greater distance from the wood than is possible with a straight instrument, thereby considerably lessening the



DESIGN 191.—PYROGRAVURE ON LEATHER. CIGAR CASE.

The motive is the tobacco plant.

chances of unintentional scorching, which is liable to spoil effects where sharp contrasts and great clearness are a necessity.

The Pattern Points are to be had in great variety. The oval, circular, diamond, star,

heart, and trefoil are most used, and various combinations can be made with them.

Wood.—The kind of wood to use depends greatly upon the size and character of the decoration. For the frieze of a room or a large panel to go over a chimneypiece, soft wood would be best, for it would allow of bold treatment of lines. But if you were intending to

excellent when a very light ground and strong contrast are required; it readily takes very dark—almost black—markings, so that a full range of shading is possible. Artists, like Mr. Hamerton in England and Mr. Fosdick in the United States, have recommended Lombardy poplar, for the opposition it affords between the line and the ground. It is rather difficult



DESIGN 192.—PYROGRAVURE ON WOOD OR LEATHER. NAUTICAL MOTIVE.

ornament a jewel-box hard wood would be best, because it lends itself to the most delicate work.

Under any circumstances let the wood be as nearly white as possible, for it affords the greatest range of tones and the strongest contrasts. It should be close-fibred and it should be soft, in order to burn readily. Holly is

to get it in England, and American white wood (which has a greenish-yellow tinge) is much used instead. Pine, elm, sycamore, chestnut, and lime are more or less suitable. Oak is best for solid furniture and wainscot decoration.

Polishing.—For a finish, the wood is either oiled or varnished. Artists will use no varnish of any kind; they are satisfied to rub pure

linseed oil into the wood from time to time until the requisite brightness is obtained. For those who prefer varnish we give the following directions: Apply it thickly and rub it down with pumice stone; varnish again and rub it down as before, and so on, repeating the opera-

aid an object decorated in pyrogravure may be made a coloured bas-relief without hiding the grain of the wood.

Gilding and Silvering may be applied by means of gold or silver leaf with very rich effect for backgrounds. Very skilful manipula-



DESIGN 193.—PYROGRAVURE ON WOOD OR LEATHER. SUITABLE FOR A TRAY OR MAT.

tion two or three times until the desired polish is obtained. The varnish should be thick, and each coat should be allowed to dry thoroughly before the next is applied.

Dye Staining.—White wood may be stained to almost any colour by means of the dyes used in printing and dyeing textiles. By their

tion is necessary for this process, and it is best to employ a professional gilder. Do not use (so-called) gold or silver paint, for they will certainly tarnish.

"Lustra Colours," or Bronze Powders, are sometimes used by amateur decorators, to enhance the effect of pyrogravure; but we

think that no artist who respected his material would spoil his work by any such meretricious addition to it.

A Substitute for Staining.—Many of the effects of pyrogravure can be obtained more easily by a process commonly used by wood-inlayers for shading. This is the subjection of the parts of the wood to be scorched or burned to the action of hot sand. The pattern or design being traced on the panel or other object to be decorated, the parts which are to remain unaffected by the heat are painted over with flatted oil paint or, for rough work, with plaster. As soon as this has hardened, the sand may be poured on. Different shades can be obtained by heating it to any required degree, and also by allowing it to stay longer in one place than in another. Either a light or a dark outline may be obtained with much greater ease than by pyrogravure, and for graduated shadows the process is much more suitable.

III. APPLICATION OF THE PLATINUM POINT.

There are two machines made specially for burnt-wood etching, but they are essentially the same in principle, which is the application of the platinum point, continuously heated and regulated by means of a little hand bellows. The heat for both is supplied by means of a highly inflammable liquid, which must scrupulously be kept away from the neighbourhood of a lighted gas-jet so long as the bottle containing it is uncorked. The vapour from the bottle could readily unite with the flame, and would then probably cause a serious accident. Kept well corked, the liquid is no more dangerous than in an ordinary lamp.

Having, so to speak, trimmed your machine by filling the glass bottle provided for the purpose about half full, put the remainder of the liquid away at once, well corked, on a cool shelf. Now fit in the stopper, to which are affixed the two flexible tubes, terminating at one end with a hand bellows, at the other with a contrivance suited for attachment to any of the extra pattern points made for borders and geometrical work, also for sizes not in common

use other than that supplied in the outfit. A small spirit lamp, furnished with a wick, is included in the outfit, for the purpose of heating the point to begin with. For this, of course, only alcohol is required. Be careful not to allow the small screw in the handle attachment to touch the flesh, because it will soon become so hot that you would be forced to drop it. Indeed, this remark applies to any part of the metal work.

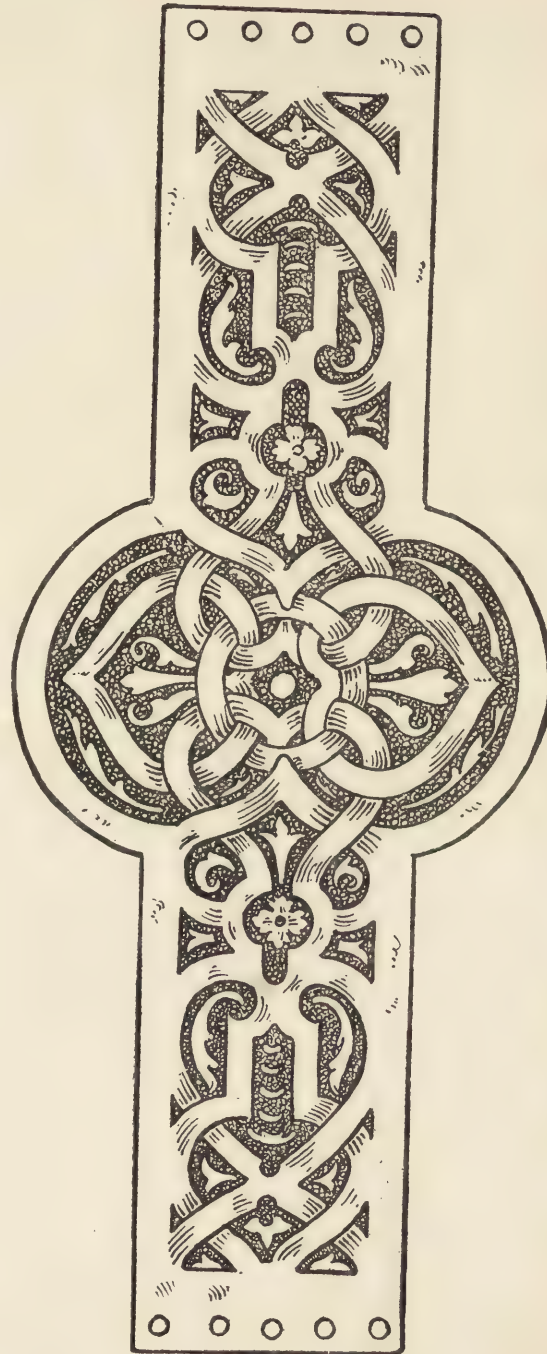
Light the spirit lamp, placed on your right hand, grasp the end bulb of the bellows in your left hand, and commence to blow very gently while holding the platinum point in the flame. In less than a minute the point should be red hot. Extinguish the lamp and set to work on your prepared design, keeping the point red hot by continually and steadily working the bellows.

If the instrument be allowed to cool beyond a certain point, resort must again be had to the spirit lamp, so as to start it again. At first, from want of practice and, perchance, from over-anxiety, there will be some little difficulty experienced in keeping up a steady, even heat, and still more in controlling it so as to suit exactly the needs of the design in hand. This difficulty will not be overcome until the action of the left hand has become almost involuntary, following mechanically the will of the worker in controlling the point of the instrument as he draws with it. Practise several kinds of strokes on a piece of waste wood until you have mastered the sensations, which are not unlike those experienced by a novice in swimming when he endeavours to put in practice the theory of the contrary action of hands and feet at the same time.

The point should be red hot even for making a delicate outline. The whole art in execution lies in the regulation of the pressure and in the even sweep of the tool. Any hesitation or added pressure will deepen or make broader the line being followed.

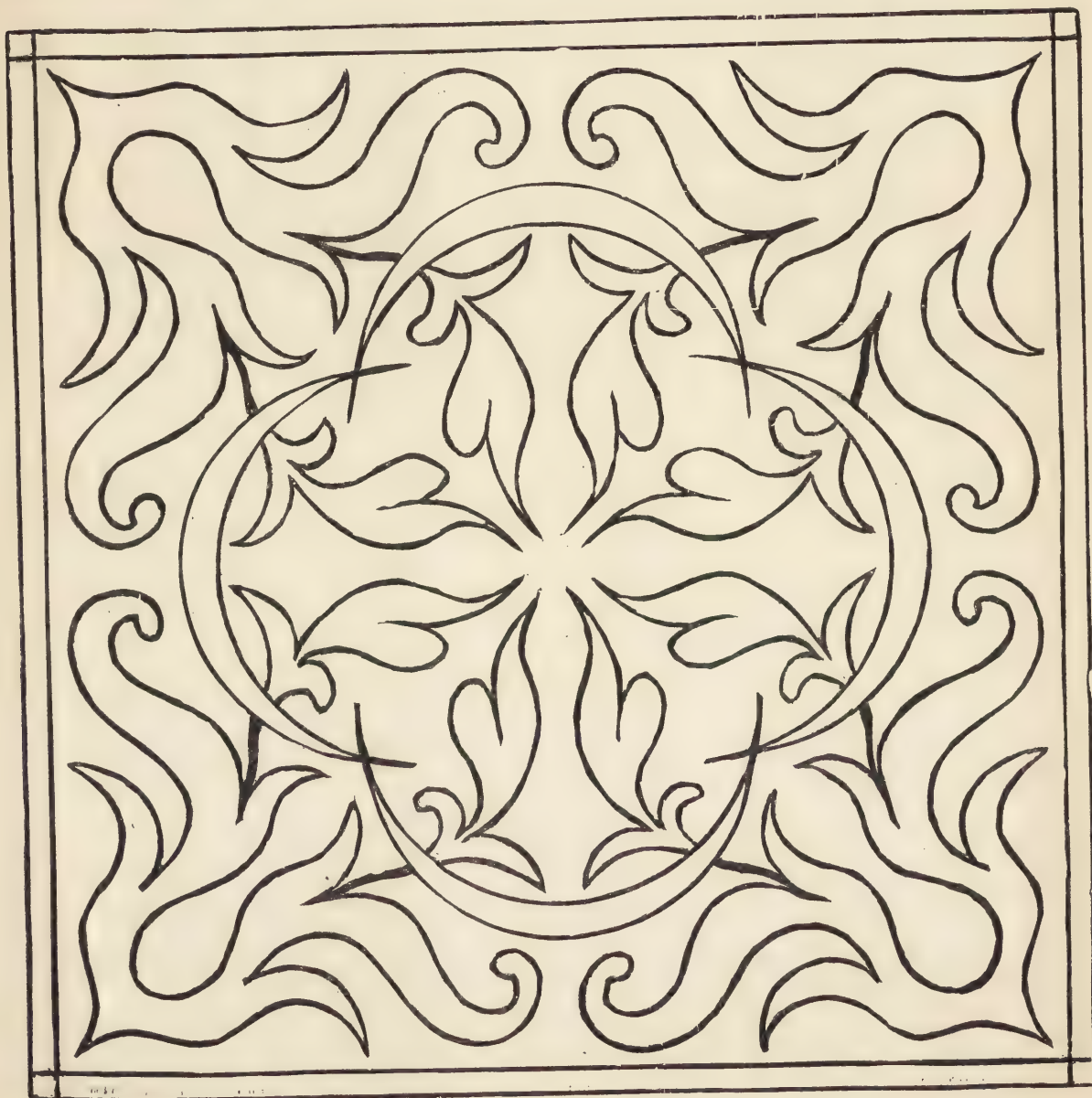
IV. PYROGRAVURE ON LEATHER.

Leather is a delightful material for work with the platinum point. You can etch on it with much greater freedom and rapidity than upon



DESIGNS 194, 195.—PYROGRAVURE ON LEATHER. DECORATION FOR NAPKIN RINGS.

wood. The burnt line differs considerably from that on the latter. While on wood it resembles the sepia printing inks used for some bindings: "Tints of various kinds may be employed in many cases to complete the scheme of decoration; but even without the

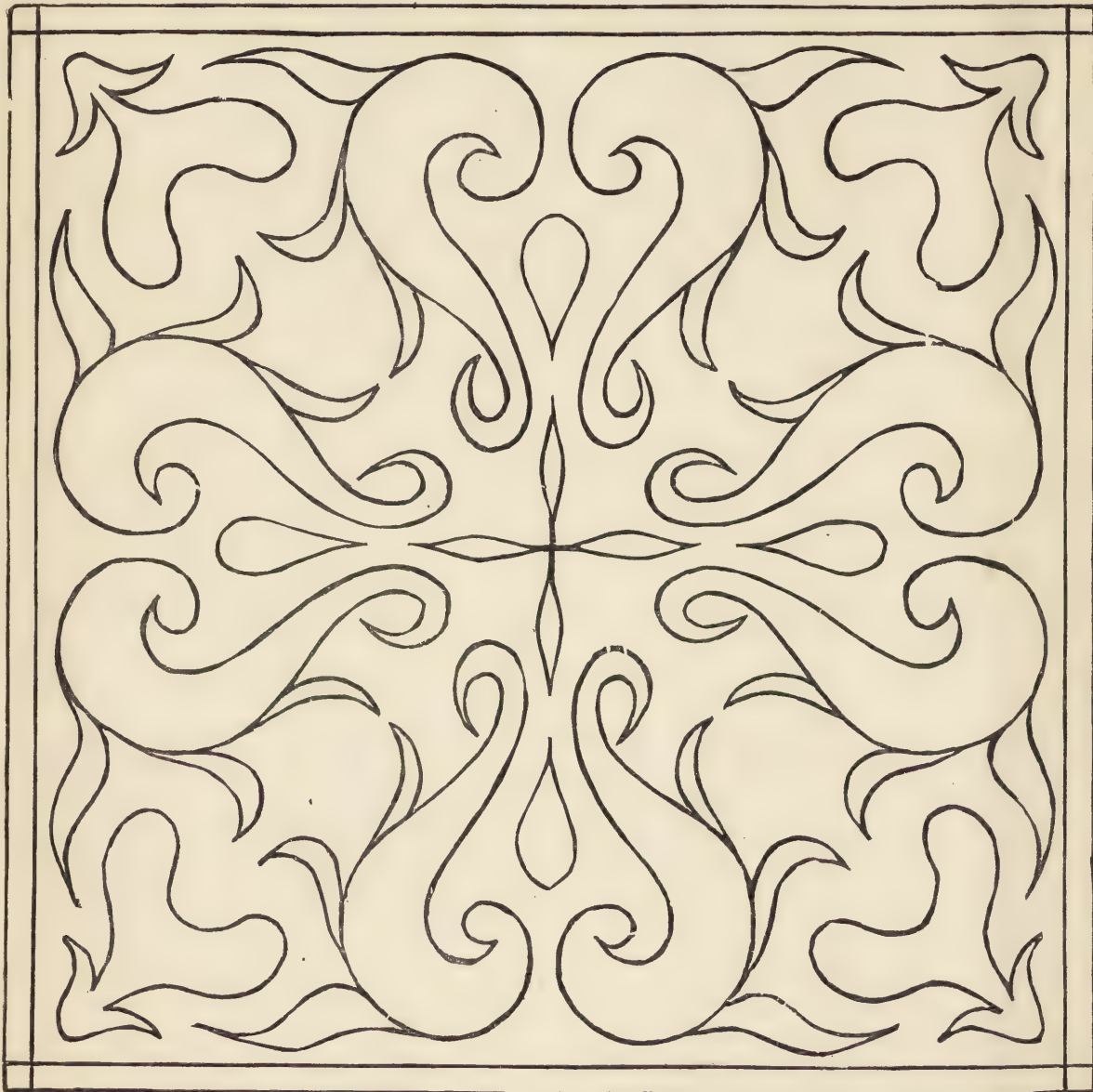


DESIGN 196.—PYROGRAVURE ON LEATHER, WOOD, OR GLASS. ALSO AVAILABLE FOR CARVING, AND CHINA DECORATION.

etchings, on calf leather it appears more as if it were clearly cut out. Hamerton suggested the application of pyrogravure to leather book-

use of colour, mere singeing produces grounds of the finest quality on which the lighter parts may be left in relief. For example, suppose

the case of a wreath designed on leather, and intended to show light on a dark ground. The outlines would all first be burnt in, which burner, which is not a point, and as the leaves would be left of the natural colour of the leather we have already three most valuable



DESIGN 197.—PYROGRAVURE ON LEATHER, WOOD, OR GLASS. ALSO SUITABLE FOR CARVING, AND CHINA DECORATION.

can be done with extreme sharpness and definition; then all the ground intended to be dark would be more or less browned with the elements—line, light spaces, and dark spaces. But there is much more than this, as the line may be used with considerable freedom,

and of the most various depth and thickness, while the shades admit of every variety of gradation." the stationers' shops the small leather articles that may be ornamented by this means are numerous indeed. We will only mention port-



DESIGN 198.—PYROGRAVURE ON LEATHER, WOOD, OR GLASS. ALSO SUITABLE FOR CARVING, AND CHINA DECORATION.

White kid, no less than the more ordinarily used soft brown leather, lends itself admirably to decoration with the platinum point. At folio covers of all kinds, blotting cases, bill folders, boxes for jewels, gloves, and handkerchiefs, belts, baggage labels, calendar cases,

card cases, ticket cases, covers for travelling clocks, comb cases for the pocket, cigar and cigarette cases, eyeglass cases, match-box cases,

"The trade" must need designs for many such articles. If you seek to supply them, bear in mind that simplicity is the great thing to be



DESIGN 199.—PYROGRAVURE ON LEATHER, WOOD, OR GLASS. ALSO SUITABLE FOR CARVING, AND CHINA DECORATION.

blotting pads, cases for pocket-knives, music rolls, postal-card cases, penwipers, photograph frames, razor straps, and shawl straps.

aimed at—the best effect that can be got with the smallest amount of work: remember that a design has to be reproduced by hand with

great rapidity in order to make it profitable to the manufacturer. Nearly all amateurs so overload their designs with detail that they are quite unavailable for purposes of "the trade."

V. TREATMENT OF SOME DESIGNS.

The four designs (pp. 121, 122, 123, 137) which take the hawthorn for their motive may be easily carried out on American white wood or on calf leather. They illustrate a variety of effects obtainable in pyrogravure. In Design No. 244 flowers and foliage are brought into prominent relief by means of a shaded background, the forms depending merely on a clear outline. This at first sight may appear simpler in execution than Design No. 248, which shows the forms shaded on a white ground; but it is not so, because any slight inequality in shading the flowers would be little noticeable and much less objectionable than inequalities in a flat shaded background; evenness of tone would be of the greater consequence in proportion to the size of the surface to be covered. Design No. 243 is more elaborate: it introduces shading in dots on the lighter portions of the foliage, which gives a pleasing variety and nice breadth of light and shade. Be careful to burn the dots very lightly.

The fourth of the series (Design No. 245) shows the flower forms entirely burned away; they should not, however, be charred till they are black, but burned to a rich dark brown; a broad point is best for this purpose.

This set of designs, primarily intended for book covers, may be applied to a variety of purposes. No. 248 is well suited, just as it is, for the under panel of either No. 243 or No. 245; but if the two last named are to be combined, it would be well to treat the flowers on both sides of the cover after the same manner, either in line shading or all dark. The latter is the more striking. To join the two panels, burn two small holes at the back and one in the front of each panel; pass some narrow ribbon through these, tie bows at the back, and

leave ends in the front to tie when the cover is closed.

Another way is to glue a lining throughout both panels, leaving the thickness of the book to be covered at the back between the two. By repeating one of the designs four times on one piece of wood, and bringing them close together, utilising the dotted border around No. 245 in doing so, a charming blotting-book cover could be made. The design for the back might be made up of the corners of No. 248, with the addition of a large monogram for the centre.

VI. PYROGRAVURE IN INTERIOR DECORATION.

Not only furniture, mantels, and the like may be acceptably decorated by pyrogravure; sometimes a room is so decorated throughout—ceiling, walls, doors, and even flooring being carried out in harmonious designs. Such decoration one would hardly think would wear well for a floor much in use; but it might take the place of a parquet border around a room, with a rug thrown down extending to within two or three feet of the walls.

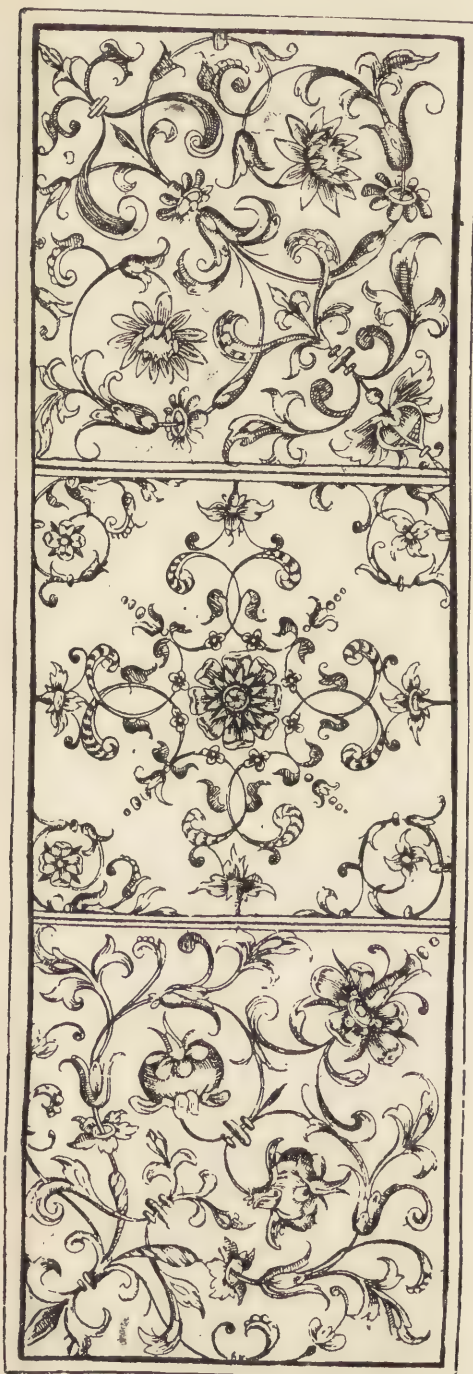
A wainscoted and open-ceiled hall, or dining-room, or library, of Gothic or early Renaissance design, would offer the best field for such an attempt, and oak would be the most favourable wood. If combined with other modes of decoration, the effect need not be at all sombre.

The architectural mouldings should be left plain, and the decoration should be confined to the panels of wall and doors and the beams and panels of the ceiling. For the beams we would recommend a bold running vine pattern, forming openings to be occupied by medallions. The vine should be outlined deeply, so that it will form an incised relief; and the highest parts may be brought out with a little rough gilding. The openings may be filled with shields painted in bright colours, or with conventional rosettes. But the treatment of the beams should be decidedly bolder and less elaborate than that of the panels between,



DESIGN 200.—PYROGRAVURE. PART OF A PROCESSIONAL FRIEZE DECORATION FOR A DINING-ROOM, BY J. WILLIAM FOSDICK.

which require to be filled with a more delicately



DESIGN 201.—PANEL DECORATIONS IN PYROGRAVURE.

traced design, and to be helped out by a more liberal application of painting and gilding. As

a rule, blue makes the most effective ground colour, and festoons of fruit, or strap and ribbon-work in the Renaissance manner, on either side of a central medallion, will be found effective in most instances. The fruits, flowers, and borders may be touched with colour, as well as gilding, but the colours are best applied after the panels are in place, and it is possible to judge of their effect. Such designs as are commonly used in stamped leather work, lincrusta, anaglypta, and stamped wall papers may often be adapted to use in such a ceiling as we are describing; but the adapter should merely select from them such details as can be rearranged with reference to the dimensions of his panels and the general architectural scheme of the room. Ordinarily, it is well to make the design symmetrical, with a very marked and important centre.

The panelling of walls, doors, and mantel calls for yet more careful treatment, and if judiciously introduced, light-coloured woods, such as maple, or, in very small panels, box-wood may have an excellent effect. In this latter case, the various methods of scorching and staining the wood come into play. Sole leather, also, gives very good and somewhat peculiar results. As it burns to a sharp edge, the line produced may be very clean and precise, while even the fine-grained woods give always a broken line. Leather has the further advantage that the background may be enriched by stamping with small hand stamps. It may be painted upon with opaque oil paints used thickly, without any preparation; or it may be silvered and then painted over the silvering with transparent colours.

It is waste of labour to attempt to give their general form to objects by means of pyrogravure. All architectural embellishments, such as columns, mouldings, carvings in high relief, and the shaping of chair-backs and other furniture should be produced in the usual manner. The province of the pyrographer is to decorate the surfaces left by carpenter and carver. If properly executed, his work blends

well with both carved and painted work, and forms an intermediate sort of decoration, which should tend to produce a harmonious general

used so as to obtain varying depths and widths of line. How pyrogravure may be applied pictorially in decoration is illustrated by our



DESIGN 202.—PANEL DECORATION. PYROGRAVURE AND PAINTED LEATHER.

effect. In the case of oak furniture the acid stain may be used to give colour to the ground, saving out the masses of the design, which should be carefully outlined, several tools being

reproduction of part of a frieze (p. 71) which Mr. J. William Fosdick designed and executed for an American millionaire's dining-room.



DESIGNS 203-207.—PYROGRAVURE AND PAINTED LEATHER DECORATIONS.

VII. GLASS PYROGRAVURE.

The platinum point to be used on glass must be made many degrees hotter than for wood or leather. It is not enough that it shall frequently be held in the flame to make it red hot. It must be constantly kept at almost white heat: a special point, supplied with an inner appliance

be well distributed over the glass, or it may crack it.

Glass Pyrogravure is especially suitable for the decoration of mirrors, fire-screens, and photograph-frames. Ordinary plate-glass is used, but it must be of the hardest kind. Except on looking-glass, there is no necessity



DESIGN 208.—PYROGRAVURE DECORATION FOR A TABOURET (*see p. 48*).

for generating and retaining heat, is sold for the purpose.

The ordinary point heated to almost white heat might be used; but the process would be tedious and the point would soon get too much damaged for further service. The pressure must be steady but not hard, and the heat must

to trace the design, for it has only to be put under the glass itself and worked over like the ground-glass of a child's drawing-slate.

The effect is similar to that of etching on glass with acid; but, happily, it can be done without the danger of inhaling the noxious fumes of hydrofluoric acid, to say nothing of

the risk of contact of the flesh with such a dangerous fluid.

Sometimes the lines of glass pyrogravure are

paint is wiped from the glass, which, being quite clean, is then covered entirely with a thick coat of white enamel paint, rendering the glass opaque, and giving the effect, from the back, of



DESIGN 209.—PYROGRAVURE DECORATION FOR CIGAR CASE.

filled in with gold paint, which show effectively from the other side. With a pad of soft cloth dampened with turpentine, the superfluous



DESIGNS 210, 211.—PYROGRAVURE AND PAINTED LEATHER DECORATIONS.

polished ivory with incised gold tracery. In laying the paint, care must be taken not to drag up the gold from the lines.

LEATHER AND LINCRUSTA DECORATION.

I. STAMPING, GILDING, PAINTING.

WHAT is usually called "stamped leather," made and sold by the roll, it would be more proper to term "embossed leather," for the design in relief is obtained by pressure between rollers, one bearing the design in relief and the other its concave counterpart. The manufacturers, however, occasionally produce a little work on the principle of old Venetian stamped leather, the stamping of which was done by hand, with small stamps like bookbinders' stamps. This is a sort of work which may easily be done by amateurs, and which may be developed into a home industry of some importance.

Sole leather is the only sort to use. The thin leather used for embossing will not do for stamping. If only a panel is to be made a single piece may, perhaps, be found large enough to answer; but if a considerable surface is to be covered several pieces will be required. The edges should be neatly cut, so that the several pieces may meet exactly when in place. They can be fastened to the wall with very strong glue and with brass-headed nails. The slight interruption of the design by the latter, and by the joining of the several pieces, does not count if the design is large and bold, as it ought to be. The leather may be wrought on plain if its natural colour is considered sufficient, but much richer effects can be had by first coating it with silver or tin or aluminium leaf. This purely mechanical work should be done by a competent gilder. It is well to know, however, the manner of procedure, and the amateur if he chooses can try the work himself.

To Gild Leather dampen the skin with a sponge and water, and strain it tight with tacks on a board sufficiently large. When it is quite dry, size it with clear double size; then beat the whites of eggs with a wisp to a foam, and let them stand to settle. Next take books of leaf silver and blow out the leaves on a gilder's cushion, pass over the

leather carefully with the egg size, and with a tip brush lay on the silver, closing any blister that may be left with a wad of cotton. When this is dry, varnish over the silvered surface with yellow lacquer until it becomes a fine gold colour. The gilded skin is then cut into strips of the desired sizes.

Another Way is that used by the bookbinder. He first goes over the part to be gilded with a sponge dipped in white of eggs that has been beaten up to a froth and then allowed to settle; then, being provided with a brass roller, on the edge of which the desired pattern is engraved, and fixed as a wheel in a handle, he heats it before the fire until the surface will just hiss if touched with the wetted finger. While the roller is heating he rubs with an oiled rag the parts of the leather which are to receive the pattern, and strips of gold leaf, which he presses down with a wad of cotton. He then runs the roller along the edge of the leather and wipes off the superfluous gold with an oiled rag. The gold only adheres where the roller has left its impression.

Tools and Appliances.—The next requisites, after the silvered leather, is a stamping-block of some middling hard wood and a supply of bookbinders' stamps. These are small stamps engraved in brass and having long shanks which are secured in wooden handles. Their variety may be judged of from an examination of bound books in any book shop. Those that are best for the present purpose are the simpler sorts. To secure variety of effect it is necessary that some should be very "open"—that is, should have their design in outline, while others should have considerable surface. It is also necessary to have some varnishes and oil colours, a list of which will be given farther on, a few large camel-hair brushes and small sables, and a tracing point of ivory, bone or agate.

The design, having been prepared or copied on thin but tough paper, is laid over the silvered leather and traced with a strong pressure by the point so as to leave a good mark on the leather. If thought desirable, this can be gone over with a fine sable brush and brown

varnish, but it is better to be careful and depend on the indented line left by the tracer.

The tools are now selected—different tools for the background and for the different parts of the design. Some parts, as flowers and foliage that are to appear in their natural colours, are left plain. As a rule, the background tooling should be the heaviest, and should be done with tools having a good deal of surface. The tools should be warmed moderately in the flame of a spirit lamp, and should be applied with a quick pressure of the wrist and arm. The work should be carried as nearly as possible up to the outline, the tools never being changed in the same part of the design.

The tooling will give the effect of a richly diapered surface, but the pattern will still be rather difficult to make out. The next thing is the treatment of the background. This may be left in silver, may be covered down with two or three coats of gold varnish, or may be gold varnished in parts, when these are entirely enclosed and shut off from other parts of the background by the lines of the design. This last plan gives a varied background of silver and gold, and is the most effective. Still, good old examples may be found in which the background is treated in opaque oil colour, commonly turquoise or other blue, the metallic effects being reserved for parts of the design. Besides the gold varnish there is also a carmine or ruby varnish which may be largely used if a red tone is desired. A varnish which may be made of a little powdered aloes, which can be bought at any chemist's shop, dissolved in alcohol, gives a warmer gold tone when used thinly than the gold varnish of the colourmen, and, when several coatings are given, a rich reddish brown. It serves admirably to tone the carmine varnish, which is of rather too bright a red. Mixed with blue it gives an excellent olive green. These will be all the transparent tints that will be required. The large camel-hair brushes are used in applying the varnish, which should be made to flow evenly and smoothly.

The background finished, the purely con-

ventional parts of the design are best treated in varnish of a contrasting colour; or, if the background is treated in opaque colour, these can be left in gold or silver.

The oil colours, used preferably in the naturalistic parts of the design, should be mixed with varnishes of the same colour, and be applied with sable brushes. Rather dark olives are most used for leaves, as they contrast well with the bright metallic ground. White, Dark Blue, Vermilion and Turquoise are the other colours most used in good old work. They all go well with gold and the transparent tones. The following would be a safe palette for the beginner:—

Varnishes: Gold; Carmine toned with aloes; Olive, made by mixing aloes and deep blue varnish; and aloes used alone.

Oil Colours: Turquoise made by mixing Cobalt with Emerald Green; Cobalt darkened with Black; White, and Vermilion. Extreme richness rather than brilliancy of effect should be aimed at.

The painting completed, the outline should be gone over last of all with a very strong solution of aloes and a fine sable brush. All small details—such as the veining of leaves—can be put in at the same time.

An appearance of age and a certain iridescent quality can be given the silver before working upon it by submitting it to the fumes of sulphuretted hydrogen; but it need not be said that it is an unpleasant operation. Some people find the smell of aloes unbearable, and in that case they may be replaced, but not to advantage in any other respect, by the brown varnish of the colourmen. When the work is done the smell is imperceptible.

II. BOILED LEATHER WORK.

We have given some instructions as to the stamping of leather with small hand stamps in the old Venetian fashion as a preparation for illuminating or painting. Much bolder and more effective work may be attempted with even greater ease if the leather is first boiled, or merely macerated in cold water until soft

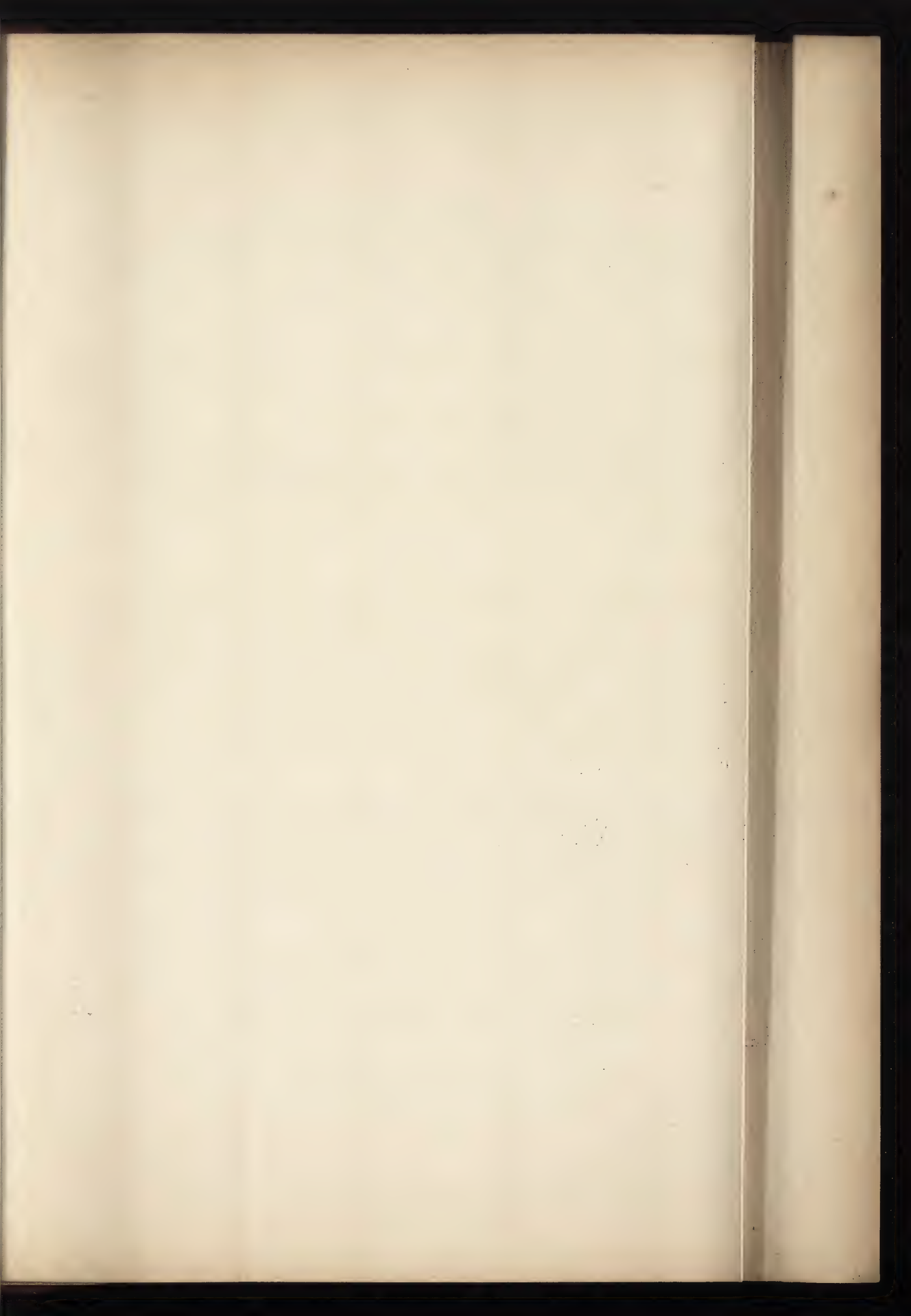


Plate H.—Full-size Design for “Cuir Bouillé” (Boiled Leather Work).



PANEL DECORATION FOR THE BACK OF A CHAIR. Designed by L. W. MILLER.

enough. If alum or soft soap be boiled with the leather, the latter as it dries becomes quite hard and remains so. This is of importance in the preparation of small articles, such as caskets and cases, which require a certain degree of stiffness in their materials. For work of this nature the plan commonly followed is that recommended by Mr. Charles G. Leland in his excellent little book on the "Minor Arts" (Macmillan & Co.), which is to boil thin or "kip" leather in alum water, apply it with strong glue on a mould first carefully made of papier-maché, and work it into the intricacies of the mould and finish the details with leather worker's tools. This plan may be easy, but it is certainly tedious and more suited to the mechanic than to the artist, besides which the articles so made can hardly be of a substantial quality. A better plan is to discard papier-maché and scrap leather and choose a skin heavy enough for the purpose. The model for this, if the work is to be in all respects original, will first be carved out in hard wood, mahogany offering the best grain. It is to be carved in intaglio—that is, the parts that are to be raised in the leather must be cut away in the wood, and the hollows must be carefully rounded and smoothed with sandpaper. If the work undertaken is a large one, such as the panelling of the walls or ceiling of a room, this wooden mould will not answer. It must, in such case, be taken to a foundry and reproduced, both in relief and in intaglio, in iron; and if the use of a press can be had, the relief had better be formed into a roller. But for the work usually attempted by amateurs, which will not go beyond a few copies of a panel, say of three or four square feet, the mahogany mould will do. The design may be drawn or traced upon the wood, which may be easily whitened with a wash of Chinese White. Round and V-shaped gouges and chisels of various sizes are used in the cutting, and may be bought of any dealer in wood-worker's tools. The sandpapering is an important part of this preliminary work, as any roughness may quite spoil the result.

The leather being boiled until quite soft, which takes but an hour or so, is pressed

quickly into all parts of the mould with a wad of newspaper; then more carefully, part by part, beginning at the centre, with the fingers; finally with wood or bone implements shaped like burnishing tools (the handle of a tooth-



FIG. 222.—SHEATH IN
"CUIR BOUILLI."



FIG. 223.—BOX IN "CUIR
BOUILLI."

Italian work of the sixteenth century.

brush may answer for one, and a set of sculptor's wooden tools may be all that will be found necessary) it is pressed forcibly into every trait of the design. While the work is going on the leather will be drying and hardening and drawing toward the centre; but it may be kept

moist and soft as long as required by a sponge dipped in warm water.

It will be readily understood that, on being lifted out of its wooden mould, the leather panel will present the design in relief, but without sharpness or precision. This, however, is but a beginning. Before allowing it to dry thoroughly and harden much may be done by filling in the flat spaces by means of small

Gothic work, and give it much of its peculiar character.

It is in the making of small objects that Mr. Leland advises the making of a papier-maché or scrap leather and dextrine mould, which is to remain as a backing within a slight covering of moulded leather. But it is better that this last should be heavy enough to stand alone. The mould for such an object may be prepared



FIG. 224.—LEATHER DECORATION. BIBLE CASE OF "CUIR BOUILLI" (BOILED LEATHER).

Italian work of the end of the fifteenth century. (Formerly in the Spitzer Collection.)

stamps, as already recommended in treating unboiled leather work. Bookbinders' stamps are the best, and may be had cheaply in great variety. Small punches are sometimes used to produce a hammered appearance, chisels and roulette wheels for lines, and when very thick leather is used lines may be incised with a sharp penknife or with a narrow wood-engraver's gouge. These incised lines, cut with the knife, are very common in good

in a variety of ways; but the best is to make a wooden core, blocking out, as it were, the general form of the object. The ornament may be carved on this, in relief if it is to be in relief on the finished object, or it may be moulded on it with powdered leather mixed with dextrine, or with plaster-of-Paris mixed with gum-arabic and alum, either of which preparations will become hard when dry. The soft leather is pressed around this core, and the

ornament is finished by tooling, as has just been described. When finished a sharp knife is run through three sides, if necessary, of the object, and the core removed. The edges are joined, preferably by stitching, while still moist—a job which can be done by any cobbler. The articles can be blackened with black ink or browned with bichromate of potash mixed with water. This last stain renders it waterproof after exposure to the sunlight, but it is poisonous.

Painting, silvering, gilding, and illuminating can be done on boiled leather as well as on ordinary leather; but there are other modes of ornamentation which we have not before treated of. One of these is to press into the soft leather stamps cut out of sheet brass or other metal. The leather will swell out in the interstices, and when the stamps are removed will show the patterns in relief. If the stamps are heated before applying them to the leather the impression which they make will be coloured dark brown, adding to the effectiveness of the ornamentation. The stamps themselves may be left imbedded in the leather, and may be fastened by small rivets. Ivory, wood, and other substances may be imbedded in the same way, making a very effective though rude sort of encrusted work. Finally, the soft leather may be moulded freely by hand, just as wax or clay may be moulded, and the flat parts may be covered or partly covered with a mosaic of scraps of various coloured morocco, as in artistic bookbinding. Vellum or parchment panels boiled and moulded as above look very much like rude ivory carvings.

III. BOOKBINDINGS.

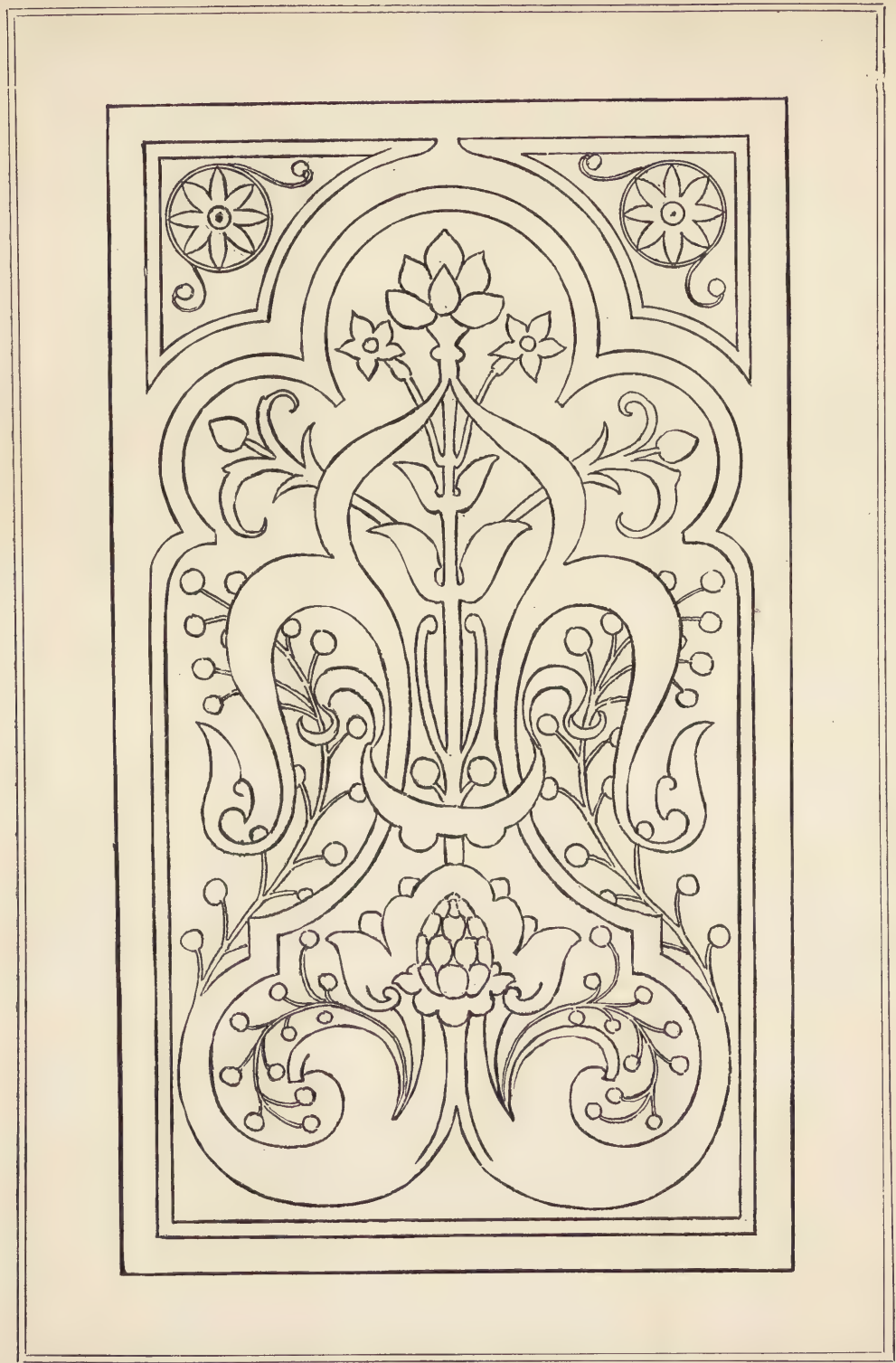
The principal modes of decorating leather bindings are but two in number—by gilt tooling and by mosaics of coloured leathers. The availability of pyrogravure for the purpose of decorating bindings has already been noted (p. 66). Designs for "cloth" (really coarse muslin or linen is used) are by far the most in demand by publishers, and we shall

presently give some practical hints for preparing them.

The **Mosaic Mode** is but little practised, and as it has had no appreciable effect on cloth bindings or cases, we will not give it much consideration. The work should be a true mosaic, but often it is only a "pastiche," the ornaments being cut out of very thin leather and pasted or glued on the leather of the ground. When they are bordered by lines impressed and gilt, as is usually the case, it may be difficult to detect the fraud. In any case, very large or very elaborate incrustations are to be avoided. The colour of the ground should cover most of the space, and other colours should appear only in small panels, or in flowers or other isolated ornaments. Yet we often see long bands, often interlaced, inserted, though if one of these become detached at a corner, the entire decoration is in danger. Flowers and other naturalistic designs should also be avoided, because they present too many angles where the leather may easily be lifted from the board.

The designer called upon to produce a design for a mosaic binding should confine himself as much as possible to geometrical forms, which he should dispose as panels, letting the leather which really forms the cover appear between and about them in broad and solid bands. He may rely on a finer ornamentation in gilt tooling to preserve his design from any appearance of heaviness. Flowers and other emblems need not be entirely discarded, but they should be strictly conventionalised and reduced as much as possible to square or circular forms. The effect of these bindings has sometimes been imitated by painting; but it is a means that we cannot commend.

Tooling.—Of all means employed in the decoration of bindings, gilt tooling is undoubtedly the chief. The design, which must be very carefully drawn, is printed on thin paper with the tools that are actually to be used blackened in the flame of a candle. The design may be such that special tools may have to be used for it; but this, of course, increases the cost, and the designer should therefore keep as much as possible to the forms commonly



DESIGN 212.—MOSAIC LEATHER WORK FOR BOOKBINDING. ALSO SUITABLE FOR PYROGRAVURE ON WOOD, LEATHER, OR GLASS.



DESIGNS 213, 213A.—MOSAIC LEATHER WORK FOR BOOKBINDING. ALSO
SUITABLE FOR PYROGRAVURE.



DESIGN 214.—MOSAIC LEATHER WORK. ALSO SUITABLE FOR PYROGRAVURE.

used. These are straight lines (called fillets), curves (called gouges), small circles, stars, dots, spirals, leaves and flowers. Innumerable patterns may be made with these simple elements, and the best plan will be for the designer to buy himself a set of the most usual forms only, and work out his patterns with them. Should the binder to whom the design is committed not have the same forms, he will be sure to have others nearly alike, and it makes little difference in the general appearance of a design whether a small leaf or flower be a little different from that in the drawing or not. Small tools only must be used, for it is important that the gilder should see all around it, in order to be sure that he is pressing it evenly into the leather. It is hardly necessary to add that these tools are appropriate for many other articles made of leather, as well as for book-bindings. They may be got through any large hardware house.

The design, worked out on the paper, is pasted at the corners only on the cover that it is intended to decorate, and the same tools are again applied, each in its place, to impress the design through the paper into the leather. In what is called blind tooling, that is, without gilding, this impression is merely deepened and darkened by another application of the tools previously heated. But if the design is to be gilt, white of egg is applied as carefully as possible with the point of a fine sable brush: two coatings are considered necessary; upon this the gold leaf is laid, and is forced into the original impression with the heated tools. It is generally necessary to apply a second gilding, at least in parts. If the tools are not applied exactly in the marks first made, or if the pencilling with white of egg be not very carefully done, a blurred or heavy impression will result. The finishers of the present day (as the gilders are called) are as skilful as the forwarders (those who shape the book and cover it with leather) are careless or awkward, and the amateur who competes with the regular shops in gilding will have no easy task. We advise him to content himself with making the design in the manner above described.

There are many well-known historical styles; but practically, the forms of design applicable to a binding may be reduced to a few. The boards or sides of the cover may be decorated with a border only, sometimes, but improperly, executed with an engraved roll; they may have corner pieces or centre panel only; they may have a diaper all over of

the fleur-de-lis, the rose, or other emblem; or the entire space may be divided up into ornamental panelling, and the compartments filled or not with small scrolls, branches, and the like. This last, the richest and most artistic mode of design, is one of the oldest. In its plainer forms, of panels made by interlacing bands or fillets, it is known as the Grolier style, after a celebrated book-lover and collector of the fifteenth century. In some respects, no more beautiful bindings have ever been made. Straight lines predominate in them, or are cleverly combined with curves to form the outlines of the compartments, which are generally left plain except for a little lettering. Very soon, however, the compartments were filled in, at first with bold scroll-work and conventional leaves, all worked with the curved tools called gouges, with the occasional aid of tools copied from the printers' ornaments then in use. Later, very rich designs of branches with small and large spirals, leaves, and flowers were used, and these, in



DESIGN 215.
"TOOLING"
FROM AN OLD
BINDING.

turn, were supplanted by the finest filigree work in the seventeenth century bindings attributed to Le Gascon. Little or no progress has been made in designing for tooled bindings since this time; but the technique has been perfected to the utmost.

The design given on p. 82 is a fair example of the more elaborate modern adaptations of the old Grolier bindings.

LINCROSTA, OR ANAGLYPTA DECORATION.

Lincrusta, or its competitor Anaglypta, lends itself readily to surface decoration in the manner of leather. Ordinary oil colours may be applied as easily as to leather or wood. But it is to the former that these two patented materials are most akin, although we have not heard of any one who has tried the boiling or macerating experiment with them. Gold and silver leaf adhere to them as they do to leather, and these in turn may be tinted to any shade by thin washes of transparent coloured glazing varnishes. Capital effects can be obtained by giving to the material some delicate shade or gradation of shades in oil colours, and, when dry, drawing a flat brush, charged with gold or other bronze powder, rapidly and lightly backward and forward over this tinted surface. The raised rib or grain catches minute particles of the metal in powder, with the effect of colour seen through a film of gold. The brush should be held horizontally, and only as much bronzing liquid should be added to the gold as will enable it to leave the brush easily. A thin coat of white shellac varnish subdues the brilliancy of these effects, but adds to their permanency.

For oxidised silver, cover in silver leaf, or, if preferred, in one or both silver bronzes. Glaze the silvered surface with white shellac varnish; when this is dry rub a brush well charged with dark blue-gray oil colour into all interstices of the ornament in relief, as well as upon the background, leaving the colour thickest upon those portions of background more immediately surrounding the raised ornament; now remove the colour from the highest points by rubbing with a soft cloth tightly folded, and pass a clean brush over those parts in lower relief that require to be left in half-tone. Duller yet more artistic effects are produced by using "dry colour" in powder for the deepest shades. It is of importance that these colours lie thickest on those parts of the design thrown most into shade, and, as in natural oxidation, the surface forming the background should have fewer and more subdued lights than the more prominent

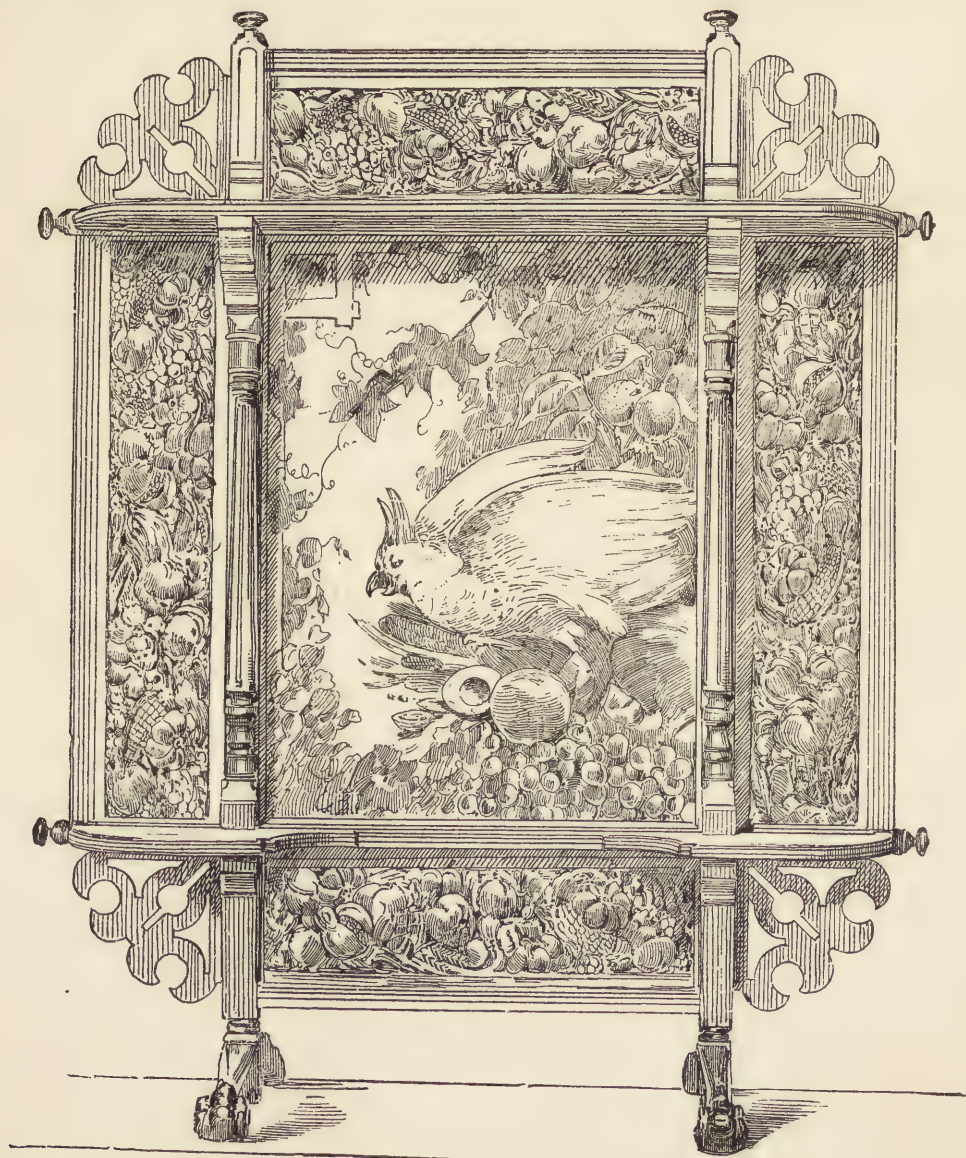
parts of raised ornament. A careful study of some piece of silver oxidised by nature will help the reader more than many words; and every little grace of burnished light and softened shadow, noted on the true chasing and transferred to the work in hand, will give to it further beauty.

For a fairly permanent bright green bronze, paint over a first coating of brown dryer, a second of copper bronze in powder, mixed with bronzing liquid; dry thoroughly. Over this draw a brush loaded with green bronze powder, also mixed with bronzing liquid; clear the high lights by rubbing with a soft cloth, allowing patches of the copper to show through on the background also. Dry well, and heighten the effect by drawing a brush, containing pale gold bronze, damped with bronzing liquid, and held horizontally, rapidly backward and forward, catching lightly the prominences. When dry, coat once or twice with white glazing varnish.

This again may be toned, where more subdued effect is desired, by a thin wash of *Terre Verte* (oil colour), thinned with boiled linseed oil, and more rubbing with a soft cloth, to bring out, or keep under, the various portions of relief. For the effects of Florentine bronzes, copper and various shades of gold bronzing powders are used, with Vandyck Brown for shades. For antique bronzes use the same materials as for "bright green bronze," laying first a ground of green oil paint to obtain depth in shade. When the lights have been "picked out" in coloured bronzes rub a little beeswax softened by turpentine to a thin paste, and mixed with a very little of the brown dryer, into the deepest shadows of your panel, and a few moments later pass over them a brush laden with Paris Green in fine dry powder. Care should be taken not to inhale the particles of loose powder that fly off during the final polishing with a soft cloth or chamois leather.

Some of the lincrusta and anaglypta are embossed expressly to assist the decorator. The most brilliant effects are attained by first preparing a ground of gold or silver, then

painting in strongly, with coloured glazing varnishes, the raised pattern. As these dry with great rapidity, an equal rapidity is the ornament in low relief, leaving bare the remaining spaces of bright crude colour, pass a coat of white glazing varnish over the whole,



DESIGN 216.—LINCRUSTA DECORATION. DWARF FIRE-SCREEN OR MIRROR FRAME.

The border is in lincrusta (bronzed and tinted). The centre panel is in painted tapestry. (See p. 203.)

required in the laying of them. When a wash of toning colour has been laid evenly upon the background, and over some portions of and finish by taking a sprinkling of gold dust or bronze powder upon a soft bristle brush, and polishing the surface briskly, finally using

a chamois leather or a well-worn flannel cloth. This last process blends and harmonises the colouring purposely kept crude until the end. Darker leathers may be coloured by adding brown dryer and bronzes in powder to

A panelled dado of lincrusta or anaglypta, decorated in white and gold, sets off admirably tapestries in Watteau and Boucher styles; add frieze and borderings in rich relief, or severely graceful, repeating or har-



DESIGN 217.—BRONZED AND TINTED LINCROSTA DECORATION. UMBRELLA HOLDER.

oil colours, taking the precaution to mix them well together with a palette-knife.

The fire-screen shown in the illustration is an example of how a border of "fruit pattern" in relief, bronzed and tinted, may be utilised in conjunction with hand-painted tapestry. A bevelled mirror may be substituted for the latter.

monising with tones below, and supporting a ceiling of delicate tracery, framing medallions of cupids and flowers in painted tapestry, letting the decoration melt toward the centre into delicate gradation of soft blue sky, and some idea may be formed of what can be done with the aid of lincrusta or anaglypta.

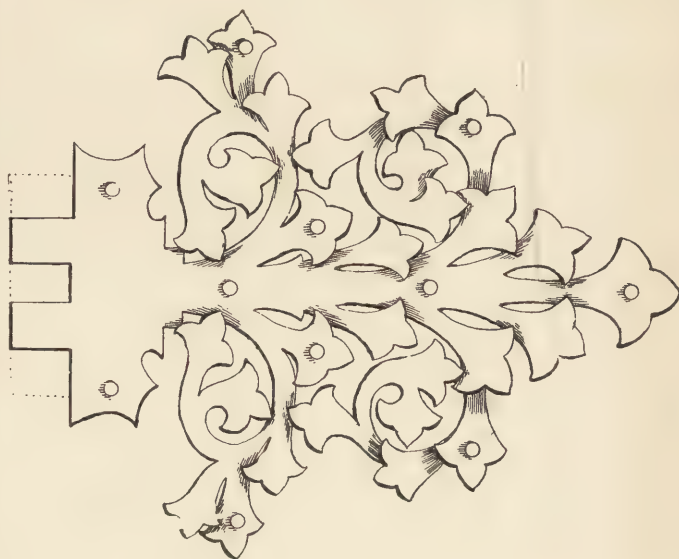
METAL WORK.

SAW-PIERCING.

METAL is hardly more difficult than wood to work with the fret-saw. The designs given for the latter (p. 57) will look very well cut in sheet brass, copper or German silver, with perhaps a few touches with the graver here and there to bring out parts that appear to overlap, or suggest the veins of leaves or markings of flowers. Etching may be employed with better effect for the same purpose. It is also a useful accessory to the decoration of cut metal in connection with wood-carving. The metal work, to be effective in this case, must be confined to those features where a real or seeming added stability is introduced by the employment of the metal decoration: such, for example, as strap-hinges and lock-plates on cabinet doors; decorative hinges and corners on caskets; or handle and lock-plates on drawers.

pinning the cardboard patterns of them in place upon the wood. You can thus prove whether or not you have measured and drawn them correctly.

Sheet metal of any thickness can be obtained



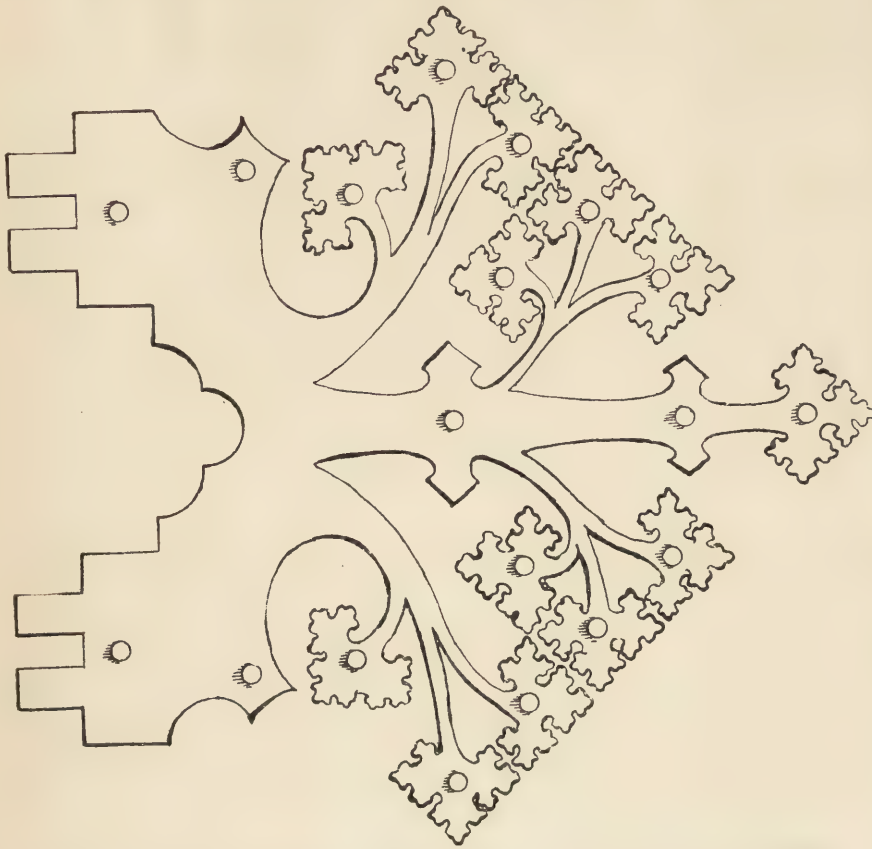
DESIGNS 218, 219.—SAW-PIERCING. CASKET HINGES FOR $1\frac{1}{2}$ -INCH BRASS BUTT.

First make a paper or cardboard pattern of each part of your object and test the parts by of the dealers. No. 22 or No. 24 (thinner) is recommended for decorative hinges, handle

plates, etc. The surface should be polished with powdered pumice-stone and finished with rotten-stone. If the best results are desired, the metal should be sent to be "buffed," by which a perfect polish is obtained.

The etched brass hinge, design No. 222, is one of a pair that was used on the doors of a small cupboard 9 inches above the top of a writing desk. The doors, each 12 x 4 inches, were too small for any effective carving, but yet occupied a position demanding effective treatment. This was secured by covering the doors with a bold and elaboratedesign in metal.

Hinges of this description can be attached to ordinary brass butts by knocking out the pin and using *half* of the hinge that contains the three "bends," to which is attached (after bending the two projecting



DESIGN 220.—SAW-PIERCING. CASKET HINGE WITH TWO 1-INCH BRASS BUTTS.



DESIGN 221.—SAW-PIERCING. HINGE OF FRET-CUT METAL.

ends) the newly designed hinge, and which corresponds to the half that is thrown away. If the amateur has any mechanical aptitude



DESIGN 222.—ETCHING ON METAL. BRASS HINGES FOR CABINET DOORS.

he may readily and neatly do this; if not, it should be intrusted to a skilled worker in metal.

ETCHING ON METAL.

The principle of etching metal by acid for decorative purposes is the same as for artistic etchings (fully treated under DRAWING). The chief difference is that in artistic etching the drawing is made on the metal for the purpose of printing impressions from it; in decorative etching the drawing or design eaten into the metal is made for its own sake, being the final and, indeed, the only object sought. To prepare the plate for etching cover the face with a thin coating of wax, which can be readily spread by heating the plate on the top of a kitchen stove, and pouring the melted wax on it from an iron ladle, holding the ladle with the right hand, while the plate is held, by means of a pair of nippers, with the left, turning the plate so as to spread the wax evenly and allowing all the surplus to run off.

The best etching ground is obtained by boiling refined wax four to six hours, which removes the "stickiness" and makes it yield readily to the needle-point in outlining, or to the lead pencil, which is the best implement to use when portions of the background are to be cleared for the action of the acid. When the wax is sufficiently boiled, remove impurities by straining it through a stretcher, or sieve, of thin, open muslin. Strain into a shallow tin pan, allowing it to form a cake three-eighths of an inch in thickness. It can be readily taken from the pan when cold and broken into convenient pieces for use.

The design to be etched must be first drawn on paper, when it may be transferred to the waxed plate by means of black or red carbon paper. The plate must, of course, be waxed on face and back. When the design has been transferred to the plate, go over the lines with a dull point, being careful that the lines are traced clear to the metal. When the design has to be eaten completely through, it is desirable to trace just outside of the line, so that the eating away by the acid may not encroach on the design. When the

design has been traced on the plate, place it in a porcelain dish, or shallow wooden trough, and pour pure nitric acid over it till it is covered about a quarter of an inch. If the etching is done in cold weather it is advisable to keep the acid near the fire for some time before using it, so that it may not chill the wax and cause it to spring from the plate. The etching should be done in the open air. The fumes from the plate are not only disagreeable, but they would, if confined to a room, rust every metal article exposed to them.

If the design to be etched contains light line surface decoration, five minutes of the bath will probably eat it to a sufficient depth. The plate must then be taken out and tested with a point, to ascertain if the lines are deep enough. If they are not, it must be returned to the bath. When the light surface decoration is sufficiently etched, wash it by pouring lukewarm water over it; then dry with soft newspaper or blotting-paper. Now "stop out" all such lines as are eaten to the required depth, by passing a "heater" over them, which will melt the wax and cause it to fill the etched lines. The heater is made of a piece of iron or copper wire, three-sixteenths of an inch in diameter, brought to a dull point and bent. Placed in a handle and heated and brought into contact with the wax already on the plate, or with a small portion held in the left hand, it can be readily melted and deposited where required.

When the waxing up is completed—care having been taken to repair, by means of the heater, any portions where the wax may have sprung from the plate—return the plate to the bath. From thirty to sixty minutes may be required for the acid to eat completely through a No. 24 or No. 22 plate. If the design is not entirely released by the acid from the background, use a narrow steel chisel to free it. A little filing of the edges may be necessary to bring them to a desirable finish. Holes to secure the hinges, by means of round-headed brass tacks, should not be etched, but drilled.

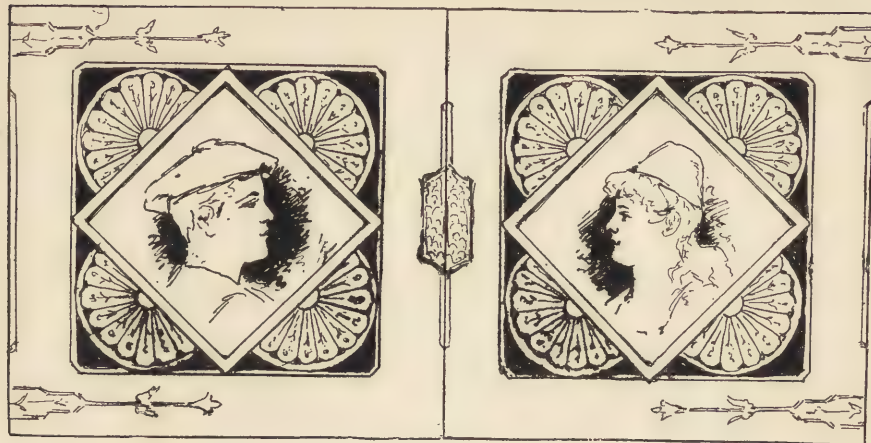
When the etching consists of a surface design only, that is, where no portions are to

be eaten completely through, it is advisable to



DESIGN 223.—ETCHING ON METAL. PANEL HAMMERED AND ETCHED.

use nitric acid diluted with an equal quantity of water.



DESIGN 224.—DOORS OF A HANGING CABINET, WITH PANELS OF ETCHED COPPER.

HAMMERED METAL.

I. MATERIALS.—ANNEALING.

Repoussé or hammered decoration on thin sheet metal is well within the abilities of the average amateur of either sex. Gold, silver, copper, brass and iron are all, to a certain extent, available.

Gold, in its different alloys, is one of the best metals for the purpose, it being extremely dense, ductile and workable; but from its cost, and the high degree of skill required to produce work of a character in keeping with the value of the material used, it is unnecessary to speak further of it here.

Silver, though expensive, is admirably suited to the demands of the amateur. Sheet silver is as hard and almost as springy as steel, and must be annealed—an explanation of the process will follow presently—in order to remove the hardness induced by the rolling to which it has been subjected.

Iron and soft steel are much used for repoussé work, and, in conjunction with other metals, give beautiful results; but, as both are of so hard a nature and somewhat intractable in a cold state, the beginner, at least, may set them aside as unavailable.

Between copper and brass there is not much choice, and it may be assumed in what follows that the methods referred to will answer in both

cases, unless a different treatment for the one or the other should be suggested.

Annealing.—This is done by heating the metal in a clear coal fire until it gets red hot all over, and then placing it in ashes to cool slowly.

The metal must now be carefully flattened. Bend it as flat as possible with the fingers and then rub the unevennesses out with the head of a large smooth hammer, the plate resting on a flat wooden block.

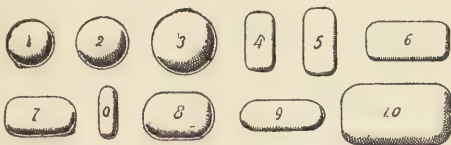
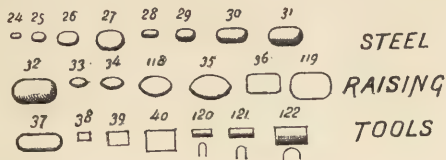
Selection of the Metal.—In choosing brass, bear in mind that the metal of a ruddy tint (when scraped) is generally softer and less liable to crack than that of the ordinary tone. This liability, however, depends largely on the amount of annealing it has undergone. Care should be taken, also, to select sheets free from specks and flaws, these causing disfigurement after the work is completed, not a little vexatious where much effort has been expended on the workmanship.

The most useful thicknesses of brass are from 26 to 22 standard wire gauge, or from 6 to 10 metal gauge. If the repoussé is to be very elaborate, and of considerable relief, the metal must be stout enough to bear, without cracking, the consequent reduction of thickness and occasional annealing. A thinner sheet can be used when the amount of hammering it has to undergo is not excessive.

Copper may, with advantage, being slightly softer, be of a thicker gauge than brass. Should you be unable to obtain metal in flat sheets, ready for use, you will have, of course, to prepare it yourself, as that supplied by dealers in rolls is too rough to be used without preparation. To do so, cut off the piece required from the roll somewhat larger than is necessary, selecting a part free from flaws. Next thoroughly anneal the metal.

II. TOOLS AND APPLIANCES.

It is important to get the best tools. Try them before buying them, or get the salesman



BRASS RAISING TOOLS

FIGS. 225-227.

to do so for you. The "temper" of the steel tools should be particularly examined, to see that they are neither so hard as to be liable to break almost at the first blow, nor yet so soft that the edges "turn" after a little use. When steel tools are properly tempered they usually show a gradual change from a deep blue in the centre, through straw colour, to a clear polished steel tint at the point. Tracers and the finer mats and punches demand more careful tempering than other tools. All the tools should be light, convenient to handle, and from 4 to 4½ inches in length.

The first requisite is a good steel or steel-faced chaser's hammer mounted on a proper

handle. The heads can be bought of various weights and sizes, from 1¾ oz. up, but are not generally used for this work above 4 oz.



FIGS. 228-230.

A good size is one of 2½ to 3 oz. The handle or stick must be of lancewood, from 7 to 9 inches in length, and very slender for a distance of about six inches, the end terminating in a knob of a flattened oval form. The illustration will give a good idea of what is meant. The great essentials in the hammer are lightness, strength, and flexibility.

A Rawhide Mallet, handled after the same manner as the hammer, will prove extremely useful both for flattening the metal and for roughly raising large surfaces, to be further worked into form afterward with hammer and tools.



FIGS. 231, 232.

The Tracers with which the outlining and similar processes are to be done are straight and curved, thick and thin, and in length (of

cutting edge) from $\frac{1}{32}$ to $\frac{3}{8}$ of an inch, according to the fineness or boldness of the work required. The most useful are those marked from 11 to 23 in the illustration. The one with which the beginner usually learns to trace is numbered 16. It is an invaluable tool. But exercise your own judgment as to the use of tools. Use whichever you find best adapted to secure the desired result. Two or three curved and straight tracers are all that will be required for some time.

Raising Tools.—A few of oval, oblong, and

times used for the purpose), to which the metal to be operated upon must be attached, and the cushion upon which the block is to be laid when in use.

The Pitch Block.—Unless the metal has a backing of some kind it will be almost impossible to impart shape to it, and unless this backing is of a proper kind the worker will be limited to the production of ornamentation but little better in appearance than a series of bruises. The only material which will answer all requirements—viz., solidity, elasticity,

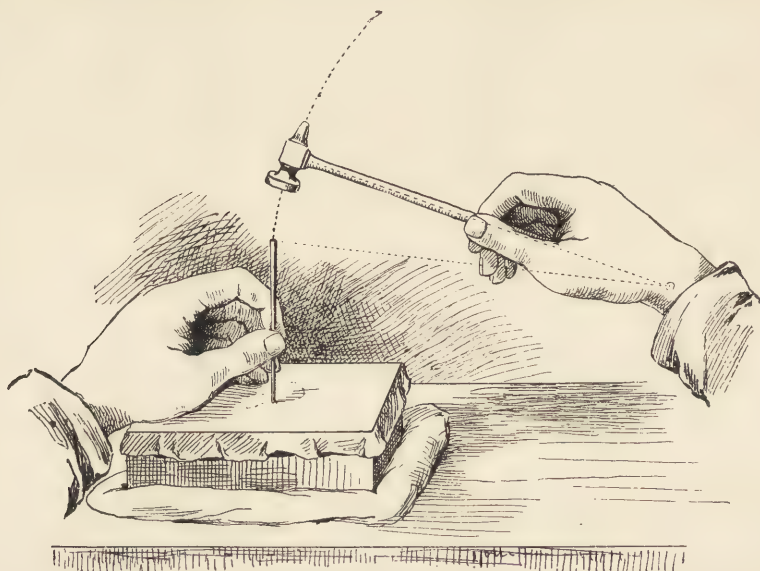


FIG. 233.—THE PROPER POSITION OF THE HANDS FOR REPOUSSÉ METAL WORK.

The illustration shows the sheet metal resting upon the cement block, which itself rests upon a cushion, so as to deaden the sound of the hammering.

vesica shapes and flat and *bombé* surfaces, the smaller ones of finely finished and tempered steel, and the larger of brass (which being softer will enable the worker to raise the metal without bruising it), and some ring tools, pearls, and mats for producing a variety of grounding and texture, are all that the beginner needs to start with—say a set of those numbered in the illustration 16, 2, 7, 43, 53, 27, 31, 35, 37, 63, and 88, which, of course, could be added to as occasion required.

Appliances indispensable in repoussé work are the cement or pitch block (a bowl is some-

adhesiveness, and facility of application and removal—will be found to be a compound of soft pitch, resin, tallow, and powdered bath brick, of about the consistency of shoemakers' wax. This is hard enough to prevent the metal, while it is being worked upon, from turning up at the edges, and yet tenacious enough to hold it until the design is outlined. You can get the cement ready made, either in lumps for melting up, or already made into pitch blocks. If you prefer to prepare it yourself, you will find that the following recipe will answer every purpose: Soft pitch, 7 lb. ;

black resin, 4 lb.; tallow, 6 oz.; bath brick, powdered, 6 lb. A commoner mixture for filling bowls or vases is: Pitch, $3\frac{1}{2}$ lb.; resin, 2 lb.; tallow, $\frac{1}{2}$ lb.; white sand heated and then to be stirred in, 9 lb. These are to be melted together over a slow fire in an iron saucepan or pitch kettle. The addition of more or less tallow will make the compound harder or softer according to requirements.

A block about twelve inches square will be quite large enough. When large pieces of work have to be done (though it should be arranged, as far as possible, to do such work in small portions, to be afterward fitted together), they must be worked in parts, the

A **Spatula**, or **Smoothing Iron**, will be needed for levelling the cement after the work has been removed from the block.

The **Work-table** should be so substantial that it will neither shake nor vibrate at every stroke of the hammer; it should have no drawers, as they greatly increase the noise.

The **Chair** or **Stool** should be of such a height that the work, when attached to the cement block and placed in position on the sand-bag, will be level with the middle of your chest. You should always sit at your work. The position chosen should be directly facing a window, or with the right shoulder slightly turned toward the window.

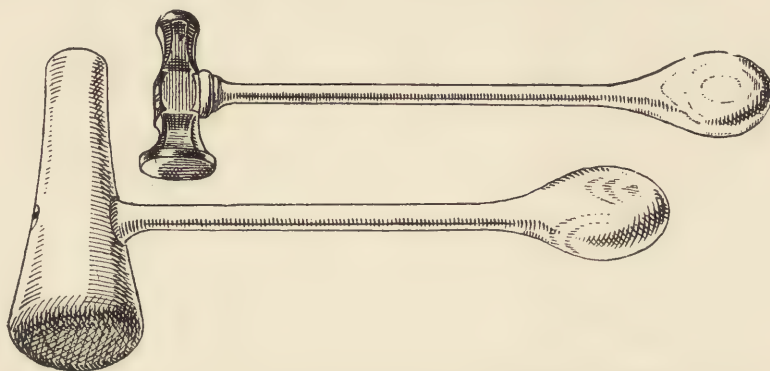


FIG. 234.—THE HAMMER AND MALLET USED FOR REPOUSSÉ METAL WORK.

metal being shifted on the block until the whole is completed. A block about 12 in. by 9 in., if 1 in. thick, will require some 8 or 9 lb. of cement.

The **Cushion** on which the block is to be laid when in use deadens the sound of the blows of the hammer. It should be made of canvas, or other material of close texture, filled with sifted river sand, and should be about $1\frac{1}{2}$ in. thick and rather larger than the block. The cushion should not be quite filled—three-quarters will be sufficient.

The **Blow Lamp** will be found useful in many ways, especially in attaching the metal to the cement block—as will be explained presently,—and when, in elaborate work, you wish to remove the pitch to see how you are getting on.

III. PREPARATIONS FOR WORK.

Cut off a piece of metal, flatten and anneal it as directed (page 92). Scour it thoroughly with coarse (F) emery cloth and oil (colza or lubricating); then with a finer (O) cloth rub the metal in a circular direction until there appears a fine graining all over the surface, after which wipe off the oil and grit with a rag on which a little turpentine has been poured. The metal is now ready.

To Attach to the Cement Block.—Light the blow lamp, the cotton of which must have been previously soaked with methylated spirit, and gently warm the surface of the cement by blowing the flame upon it, taking care to avoid burning it; this will cause the surface to become level, should there be any slight unevenness. If the cement block be very

uneven, the cement should be thoroughly softened (not melted) and the block then laid, cemented side downward, on a flat stone that has been damped, and left there with a weight upon it for half an hour or so.

Next, the metal must be made hot, rather more so than can be comfortably held in the hand, and then, while both it and the cement are warm, laid, papered side uppermost, on the cement. Press the metal firmly all over with a cloth, to avoid burning the fingers, until every part of it is in close contact with the cement. Metal and cement must now be allowed to cool for a while, so as to permit of the transferring of the design.

IV. TRANSFERRING THE DESIGN.

Place (the black side of) a piece of carbon paper on the metal, and over this lay the design, face upward. With a bone point (or knitting needle), press firmly over the lines in the pattern, taking care that the latter does not shift. Remove the paper, and the pattern should appear in black on the metal. With the etching point scratch in all the lines, and add any that may by accident have been missed. Wash out the transfer marks with a little turpentine.

If you are handy with pen or pencil you may sketch directly upon the metal, and then point in with the etcher. Turpentine smeared over the brass or copper will cause the pencil to take more readily. For ink, the surface must be scoured with a little fine sand, to remove any trace of grease or finger marks.

V. THE FIRST ATTEMPT.

Take the hammer in the right hand and the tracer (preferably the one marked No. 16) in the left, holding it with the thumb and forefinger, about an inch and a half above the cutting edge, the instrument pressing against the second finger, which should be about half an inch below the first, the tips of the third and fourth fingers at the same time resting upon the metal, and all touching each other.

The right position of hands and tools when tracing are clearly shown in the illustration.

The Tracing or Outlining.—Place the point of the tracer (which should rest against the second finger) on some portion of the outline in the left top corner of the work, slightly tilting the tool backward over the other fingers, so that the front point is just lifted off the metal. Now strike the tool fairly on the top with the hammer, and forcibly enough to strongly indent the brass or copper, and continue to do this with about the same degree of rapidity with which a clock ticks, and if the



DESIGN 225.—EXERCISE IN "TRACING" OR "OUTLINING" IN REPOUSSÉ METAL WORK.

tool is properly held and the blows of the hammer are given from the centre of its face, the tracer will move forward toward the right, cutting a line as it goes. Hold the tool with only just sufficient grip to keep it from slipping out of the hand, altering its angle, or running off the line, and make the lines by a continuous forward movement—not by punching the tool in, then shifting it and striking again, and so on. You will, at first, find this more difficult than it may appear. Probably you will give feeble and uneven blows, first on one side of the tool and then on the other, sometimes

missing it and striking your fingers instead ; then a fair and central blow ; next a blow with the edge of the hammer head ; again, a blow with the hammer turned on its side, or even upside down. This describes pretty accurately the first attempt of nearly every beginner. But do not be discouraged. With patience and perseverance you will soon get the required facility.

Trace all the lines in the pattern that run from the left top corner to the right lower corner, and all curves that have their concave side toward the worker, starting always at the top, and then turn the block round so as to bring a fresh series of lines and curves into the position occupied by those just done.

When curves of small diameter have to be traced, it will be found necessary to tilt the tool more on to its cutting point, and to strike more rapidly than when tracing larger curves, but without allowing the tool to travel any faster. Indeed, it should rather be held back than otherwise.

VI. FLAT CHASING.

With a tool like one of those marked 42, 50, 88, and 98, holding it in the same manner as directed for the tracer, except that it must be held more perpendicularly, punch the background of the design all over until the pattern only remains with a plain surface. The force

of the blow from the hammer must always be of the same strength, or the ground will be sunk more deeply in one part than another ; besides varying prominence will be given to the tool marks, a defect that will stamp the work as amateurish at once. The tool marks of tools 42, 50, and 98 should be quite close together ; those of 88 and similar ones slightly separated. Occasionally the pattern may be tooled over in parts with tools 61 to 72, but do not attempt this until you have made considerable progress in the management of the tools generally.

Much that is beautiful and really artistic can be done in this flat or surface chasing ; and of course all objects, such as trays, table tops, etc., in which it is absolutely necessary to retain a flat and smooth surface, must be thus treated. Most of the Benares and other Indian work so much admired is executed in flat chasing.

To obtain good effects in flat chasing, the matted and plain portions should be about equally balanced. It will, however, be rather better to err on the side of too little matting than on that of too much ; for when the matting is overdone the design always appears attenuated and amateurish. Pattern punches may be used in this particular branch of repoussé work with much effect, if not employed so lavishly as to give the idea that the whole of



DESIGN 226.—DRAWER HANDLE PLATE IN REPOUSSE BRASS.

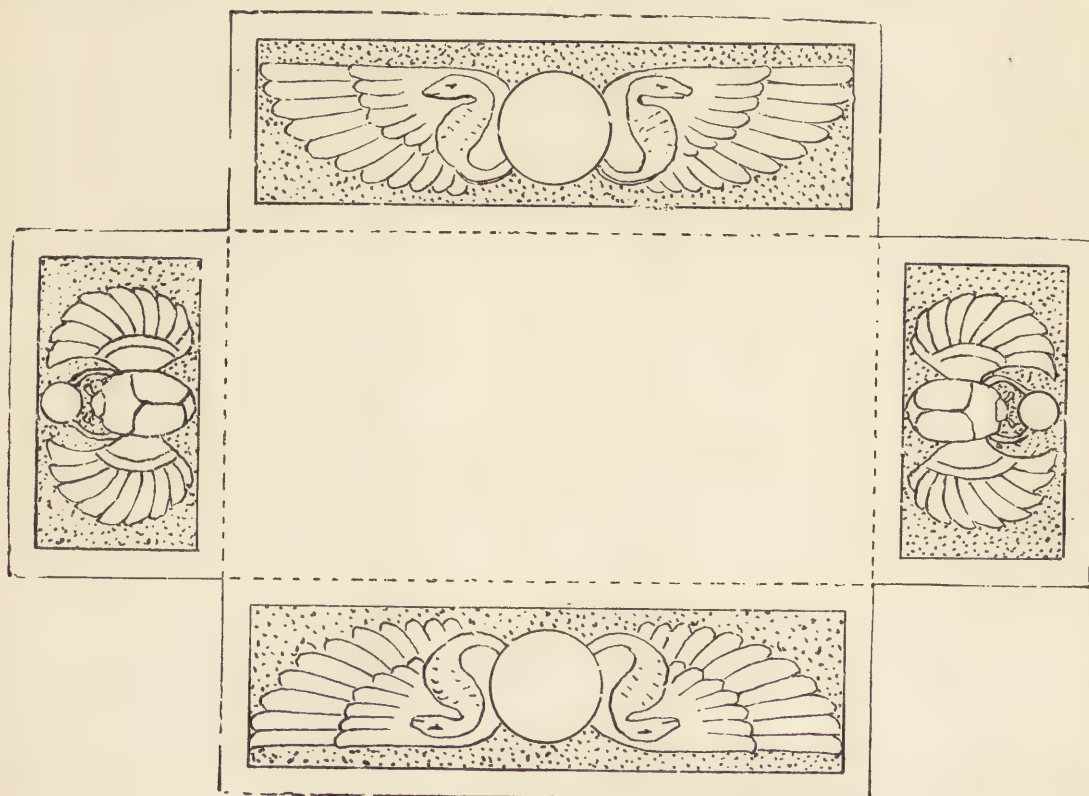
the pattern has been produced by such means. For this purpose tools 86, 87, 88, 97, 103, 105, 108, 109, 111, 112, 115, and 126 are very suitable.

VII. RAISING AND MODELLING.

Having acquired facility in flat chasing, you may now attempt to give relief to a pattern

adhering to the metal with a rag soaked in turpentine, slightly warming the plate again and again if the cement is very refractory, of course keeping the rag out of the way while using the lamp.

To protect your work if it has to be left for a time, turn the brass face downward upon the table, laying a piece of paper beneath it, and place a weight on the block.



DESIGN 227.—MATCH-BOX HOLDER, IN REPOUSSE BRASS.

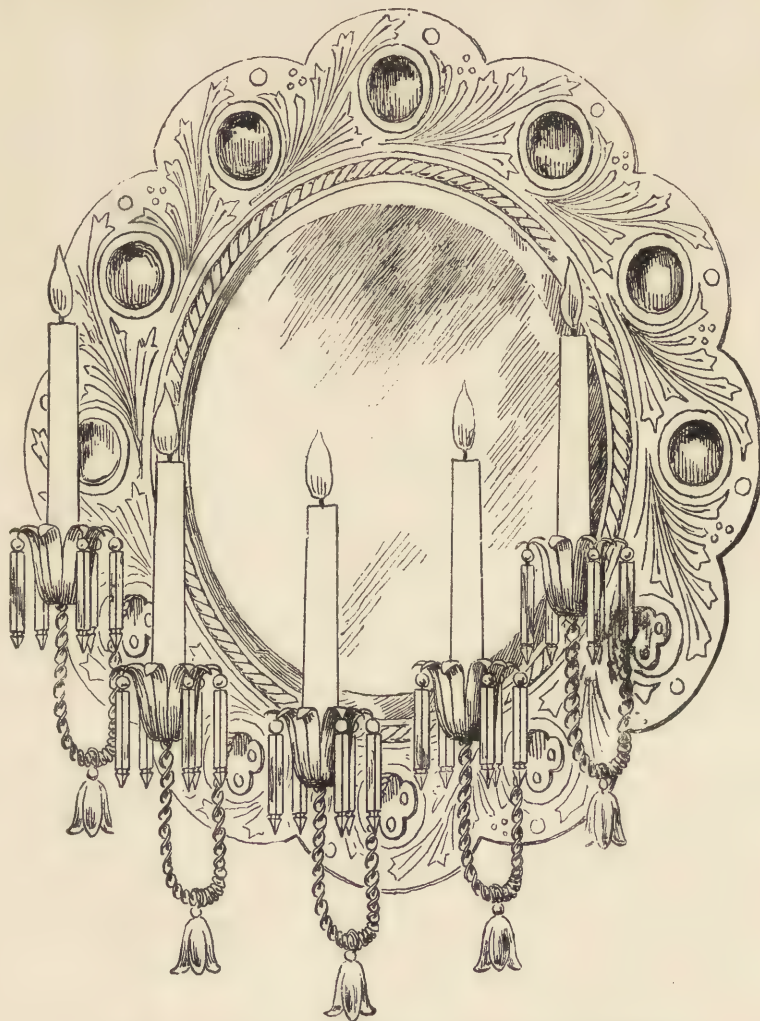
The sides are to be turned up at the dotted lines, and joined.

you have already traced. The first step is to remove the metal from the cement block. To effect this it is sufficient, usually, to drive a broad, flat chisel between the metal and the cement until they are forced apart. Should the cement prove too tenacious, heat the metal by means of the blow lamp and remove it while hot with a pair of pliers. Now flatten the cement on the block, as previously directed, and, while it is cooling, clean off all the cement

When the metal and the cement blocks are quite flat, warm both slightly, and put the former, with its outlined side underneath, on the cement, pressing it all over until every part is attached in the same manner as when it was being prepared for tracing. If the work is large, start at once, without waiting for the cooling of the cement, to raise those portions that are to stand up in relief, by hammering them into the cement by means of the largest

raising tools that can be conveniently used ; commencing at the points to be in greatest relief, and working outward toward the edges, holding each tool much in the same manner as when tracing, but more perpendicularly, and

depth all over the pattern first, and then going over it again and still further deepening it where required, until the whole looks like a mould of the work it is desired to produce. In raising, as in all the rest of the work,



DESIGN 228.—BRASS SCONCE, WITH CUT-GLASS PENDANTS.

The pendants utilised in this sconce were relics of a disused "crystal" chandelier, such as are not infrequently found in the lumber room or attic.

slipping it slowly along by means of the second finger without lifting the tool off the metal.

The sinking (which is of course really the raising when finished) should not be attempted all at once, but by stages, giving a slight

proceed slowly, endeavouring to foresee the effect the hollows will produce when seen as raised lumps on the front side, so that no very serious mistakes may be made which would be difficult afterward to correct. To sink a given space, even a simple hollow, smoothly

and entirely without bruises, will require much practice ; so that for some time all complicated modellings should be avoided, and only simple forms attempted.

It is a good plan to mould the most difficult portions in wax, and then to copy the modelling, bearing in mind that the highest points in the model should be those that are to be sunk deepest on the side now being worked, and that those of less relief should be proportionately less in depth.

As the work has once more to be turned over and again worked on its front side, it is not necessary to add every detail at this stage ; all that need be aimed at is a generally correct shaping in mass. Still, it should be noted that an inexperienced hand can do very little on the front side to raise any parts that have been allowed to remain below their proper level ; so that the work should be carefully examined in detail, in order that such portions may be put in before the plate is removed from the block previous to turning it over, or it will have to be attached again.

For raising large, smooth surfaces, as a plum, for instance, the brass tool No. 7 is the best, and for smaller surfaces, according as they are to be flat or *bombé*, Nos. 4, 35, 27, 37, 3, 31, 34 are most likely to be useful.

When very large portions—as large, say, as three inches across either way—have to be raised, it is best, after the outlining has been done, and before attaching the metal to the block, to lay it face downward on the sand-bag, and then to beat it with the mallet roughly into shape, afterward fixing it to the block and completing the process, as before explained.

When leaves or other similar objects rise suddenly from the background, a strong line must be traced, after the raising has been effected, just inside the raised line caused by the front outlining. This should be done with a thick or blunt tool, such as Nos. 14, 15, or 17, and then softened into the general body of the relief with tool No. 37. The centre veins of leaves may frequently be done in this way, but when so done they must not be worked on the front.

To obtain good effects in repoussé, it is not at all necessary, as is sometimes supposed, to resort to high relief. It is more difficult to model correctly and to maintain the due proportion between the several parts in low than in high relief. Sometimes, on removing the metal from the block when the raising has been completed, the amount of relief appears much less than it was thought to be when seen from the back ; but this, unless the design demands high relief, need not cause disappointment, provided only all is in due proportion ; for in the finishing the height may be much enhanced and all the desired effect secured.

VIII. FINISHING.

Having completed the raising and modelling, carefully scrutinise every part of the work to see that no mistakes have been overlooked. The metal may now be again removed from the block and thoroughly cleaned as before. Next, fill up the hollows in the cement block by pressing the spatula (which should have been previously made nearly red-hot) into the cement. This, as it pushes the melted cement before it into the holes, fills them quite up. While this is cooling, break up a few pieces of cement and put them in the hollows at the back of the plate just removed, hold the plate with a pair of pliers over the lighted blow lamp and so melt the pieces, until they flow and fill up the sunk portions. When every hollow is filled and the surface is quite level, allow the whole work to cool. When it is quite set, warm the surface of the cement on the plate and on the cement block, just sufficiently to make them adhere when the two surfaces are pressed together in close contact. When the cement is quite cold start the finishing or correction of the modelling from the front side.

Take a thick blunt tracer, such as No. 15 or 16, and with it (wherever the background has been raised out of the level by the beating up of the design) go round the outline of the raised parts, hammering the tool with just force enough to carry it down to its original level. At the same time try to force the metal at the edge of the relief portions underneath by hold-

ing the tool at such an angle that its top shall be well outside the work. This will tend to sharpen up the outline and give the pattern the effect of the undercutting so often seen in carvings. Care must, of course, be exercised to prevent the tool piercing the metal, which would cause a crack or hole that an amateur would find it very difficult to repair. This undercutting process is extremely useful in the treatment of foliage designs, as it offers the best method for bringing the edge of a leaf clear off the background without giving it a thick and clumsy look. When the outline has been forced back to its original position, care having been exercised to prevent its being driven below the general plane, the marks left by the tracer may be smoothed away with such tools as No. 56 or 37. Should the relief obtained appear to be of too flat a character, by commencing this operation at a little distance from the relief and working the tool toward it, something may be done to bring the pattern up more prominently, especially if the blows from the hammer are given in such a way as to draw the tool along while striking it.

Now, correct the modelling of the raised parts, smoothing out the bruises or marks that the raising tools may have left, and softening away all hardness, making the different forms blend imperceptibly into each other, so that the exact point at which a hollow begins to swell into a protuberance may not be too clearly apparent. Tools Nos. 26, 27, 34, 118 and 37 will most easily effect the purpose when concave surfaces have to be dealt with, and 36, 119, and 37 in the case of convex ones.

Of course, the whole of this process must be lightly done, and in such a way that the relief is not flattened down again.

IX. THE BACKGROUND.

The background must receive very careful consideration not only as to design, which must be well *contrasted* with the raised portions, but as regards the execution as well. It is easy to spoil a good piece of work on which great pains have been expended, by carelessness in regard

to the background. Any unevenness in the grounding will at once be detected by the eye.

The tool must be held upright and shifted with the fingers at each stroke until the whole ground is evenly covered, care being taken to strike with the same force at each blow, so that no part may be more deeply punched than another. The mark of the general tool should not be recognisable; each impression of it should overlap the one made previously. The small pearl or *pointiloir* (No. 98) will be found very useful for ordinary purposes. When the tool, however, is of a distinct pattern, such as Nos. 86, 108, 109, 111, or 112, one impression should not infringe on the next. There should be just sufficient space left around each to enable one to identify the pattern. Yet when viewed from a little distance each mark should be lost in an evenly-distributed mass.

X. TEXTURES.

Large and bold work may be considered finished at the stage we have now reached, but any object that is likely to be handled or examined in detail may receive further treatment. This will consist of giving certain textures to the raised forms or to parts of them, by means of the mat or grounding tools. Try to produce even tracks of frosting, just the width of the grounding tool, but free from spottiness or single tool marks. In the case of leaves and fruit somewhat naturalistically treated, the texture should be applied more particularly to the hollows or parts turned away from the light; the high lights may remain quite smooth.

In representing the human form, flesh and skin may be tooled over with a blunt tracer small oval raising tool, or a nearly worn out mat, like No. 72, but much care and skill will be required to avoid a seamy appearance.

For leaves, experiment with Nos. 62, 66, and 70 mats, with tracer No. 16, or raising tools 25 to 33. For fruits with melon or pomegranate-like skins use a well-worn No. 72 mat, or raising tool No. 24. Cherries, grapes, etc., may be tooled with a blunt tracer on the parts turned away from the light; but as they are somewhat

difficult to do neatly, perhaps they had best be left plain. The skins of snakes, scaly reptiles, and fish are best rendered with different grades of a half-round tracer like No. 23; but they must be punched on the underside of the work immediately after the raising has been completed, and before the metal is turned over for working on the front side. For conventional animals with scales, such as dragons, a good effect may be got by using an oval ring, punching it contiguously, and with its greater diameter parallel to the sides of the part under treatment. It is difficult, however, to find the oval tools for sale at any tool shop.

Many rough-surfaced skins, both animal and vegetable, may be effectively treated by punching, immediately after the raising has been completed and before removal from the block, the whole with a small pearl or raising tool (Nos. 42 to 48) so closely that no particle of plain surface is left.

You will make many discoveries for yourself, and if you are wise you will add greatly to your stock of knowledge by studying good specimens of silver, copper, and brass repoussé in the museums and wherever else you can find them.

XI. RAISING FROM THE BACK.

The instructions we have so far given cover the work that an amateur is likely to undertake. Sometimes, however, there may be necessary variations of the mode of procedure prescribed: as, for instance, in the case of a bowl or vase, where the outside can be operated upon with ordinary tools. In such a case there are two methods for obtaining the desired result. For the amateur the following will be the easier.

The vessel must be filled with cement (see p. 94), laid upon a sand-bag, and the design outlined upon it; after which the ground surrounding the pattern must be sunk by rather heavily matting it with a suitable punch, beginning at the centre of each space and working therefrom toward the design it is desired to raise. At each blow the metal will expand. The blows being directed toward the centre and consequently contracting the circle occupied

by the parts worked upon, the metal over and above that which the reduced circle will contain is forced into those parts untouched by the tool, thereby bringing them into greater relief and so attaining the object desired without once touching the metal from the back. This process can be applied also to flat panels when no great relief is needed, but it will be found more difficult for those than for bowls or vases; for, as there is nothing to prevent the whole plate expanding, a good deal of practice is necessary to find out the knack of making it do so only at the point where the extra surface gained by the expansion will be absorbed by the parts to be in relief, instead of being lost in a general increase of the size of the plate. The relief thus gained, both in the case of the

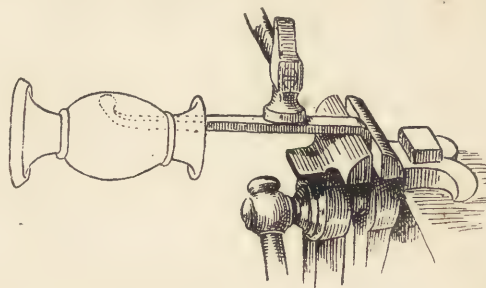


FIG. 235.—USE OF THE SNARLING IRON IN REPOUSSÉ WORK.

bowl and in that of the panel, must then be carefully chased and modelled in proper shape in the same way as explained for correcting the raising in ordinary repoussé.

The second method requires the use of a tool called a snarling iron, which is merely a stout bar of iron having an inch or two of its length turned down at right angles at one end and a round knob at the other. The turned-down end is placed in the jaws of a strong vice, and the vase, with the design drawn upon it, is passed over the knob and held firmly in such a position that the knob inside the vase is exactly under the part to be raised. Then a second worker with a heavy hammer strikes the snarling iron smartly near the vice. The force of the blow will travel along the iron and be communicated thus to the underside of the pattern on the vase, and thus, by repeated

blows and a skilful shifting of the vase as the pattern demands, a rough relief will be obtained, which, like that gained by the other method, must be properly chased up. The use of the snarling iron is best explained by the illustration.

In conclusion, we would advise the amateur who may experience difficulty in carrying out any of the foregoing instructions to consult the Messrs. Gawthorp (their Art Metal Works are in Long Acre), and if possible take a few lessons from either of them, for they are a family of artificers. A little actual practice with the tools, under expert supervision, is of more value than any instruction that can be acquired from even the best text-book.

XII. LACQUERING.

What varnish is to an oil painting, lacquer should be to metal, *i.e.*, a preservative from the deteriorating influences of the atmosphere. Generally speaking,¹ it may be used for no other purpose. Although made from similar materials (shellac, gums, and spirits) the lacquer used for a finish to brasswork is quite another preparation from the Japanese or Chinese lacquer with which trays and similar wooden objects are covered. Mr. Gawthorp gives us the following directions for lacquering brass:—

"Having obtained some French gold, which must be kept carefully corked when not in use, as the spirit in it quickly evaporates, pour out just enough of it into a china vessel to cover the hairs of the brush used. The brush should be a good flat one, of the shape used to damp letter-copying books, and just such a jar as is used with it for that purpose would suffice, although a flat, open one, not more than an inch deep, would be better. To hold the latter, a little wooden stand should be made, so that one end of the vessel shall rest on the table, the other being elevated about half an inch.

¹ This qualification is necessary in view of the fact that Mr. John W. Van Oost, who is connected with *The Art Amateur*, of New York, has, by certain secret processes, produced on metal—especially on brass—some wonderfully decorative effects in lacquer, which are valuable on their own account.

Across the opening a wire must be stretched, upon which the brush should be wiped after each dip, to avoid drips. Now warm the object

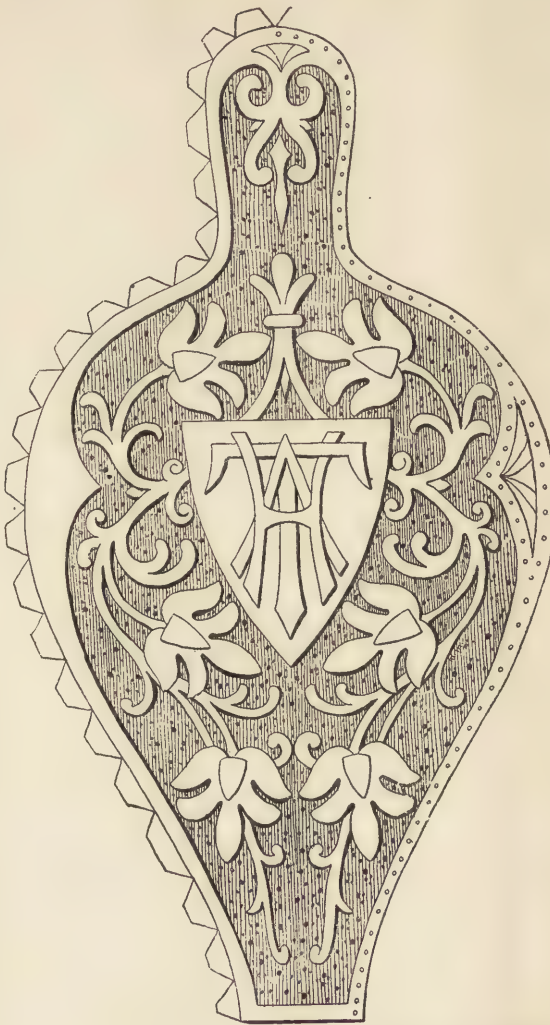


FIG. 236.—REPOUSSÉ BELLOWS MOUNT, READY FOR FINISHING.

In cutting out the sheet metal for the mount, there must be margin to allow for the thickness of the wood of the bellows lift (see scalloped lines above). Wedge-like forms are cut out around the edge. It will be observed that the greater the curve, the closer these wedges come together. Holes having been drilled or pricked in them, they are turned to the proper angle by means of a pair of wide-nosed pliers.

to be lacquered to a heat that can just be borne by the hand; and while it is hot carefully pass the brush, first dipped in lacquer

and wiped on the wire, over the surface, going from end to end (or round and round, if the article be circular) with one side of the brush, and then back again with the other, carefully joining the edges of the lines of lacquer. Then dip the brush again in lacquer, and repeat the process. If the article be a very large one, however, it will perhaps be found that one dip will only go once across. The whole surface must be thus treated, and the metal warmed again afterward, and as soon as the lacquer is sufficiently dry the same process must be again repeated, but beginning at the opposite corner, so that the parts over which the full brush was passed before will this time be covered by the brush after it is somewhat emptied, the intention being to equalise the lacquer over the surface of the article. If after this the lacquer appears iridescent, showing a variety of colours, the covering is still too thin, and another coat must be put on. The metal should never be

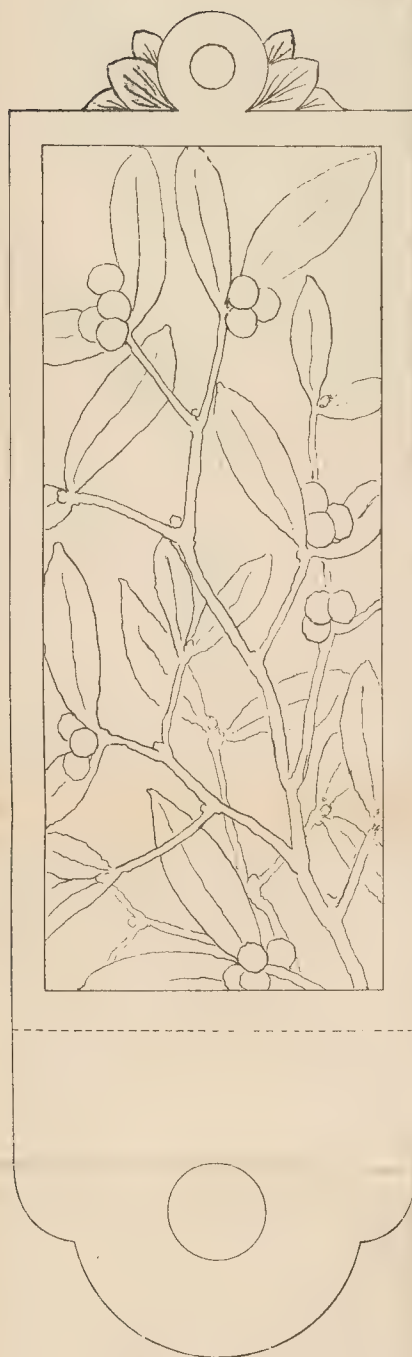
so hot as to make the lacquer gizzle when it is applied, but it will improve the brightness to make it tolerably hot after lacquering. For small articles a round brush, which should be worked in all directions, may be used.

"What lacquer remains in the brush must be squeezed out and the brush soaked in methylated spirits and afterward carefully washed with soap and water (care being taken to rinse out every particle of soap), so that before it is put away all the hairs shall be quite soft and free from lumps. The lacquer left in the tray should not be poured back into the vessel containing the clean lacquer, but kept to be used on unimportant objects, or made into furniture polish or liquid glue. The jar should be washed out with spirits. Any object spoiled in lacquering or requiring re-lacquering may be cleansed before a new coat is added by washing it with methylated spirits or with boiling soda."



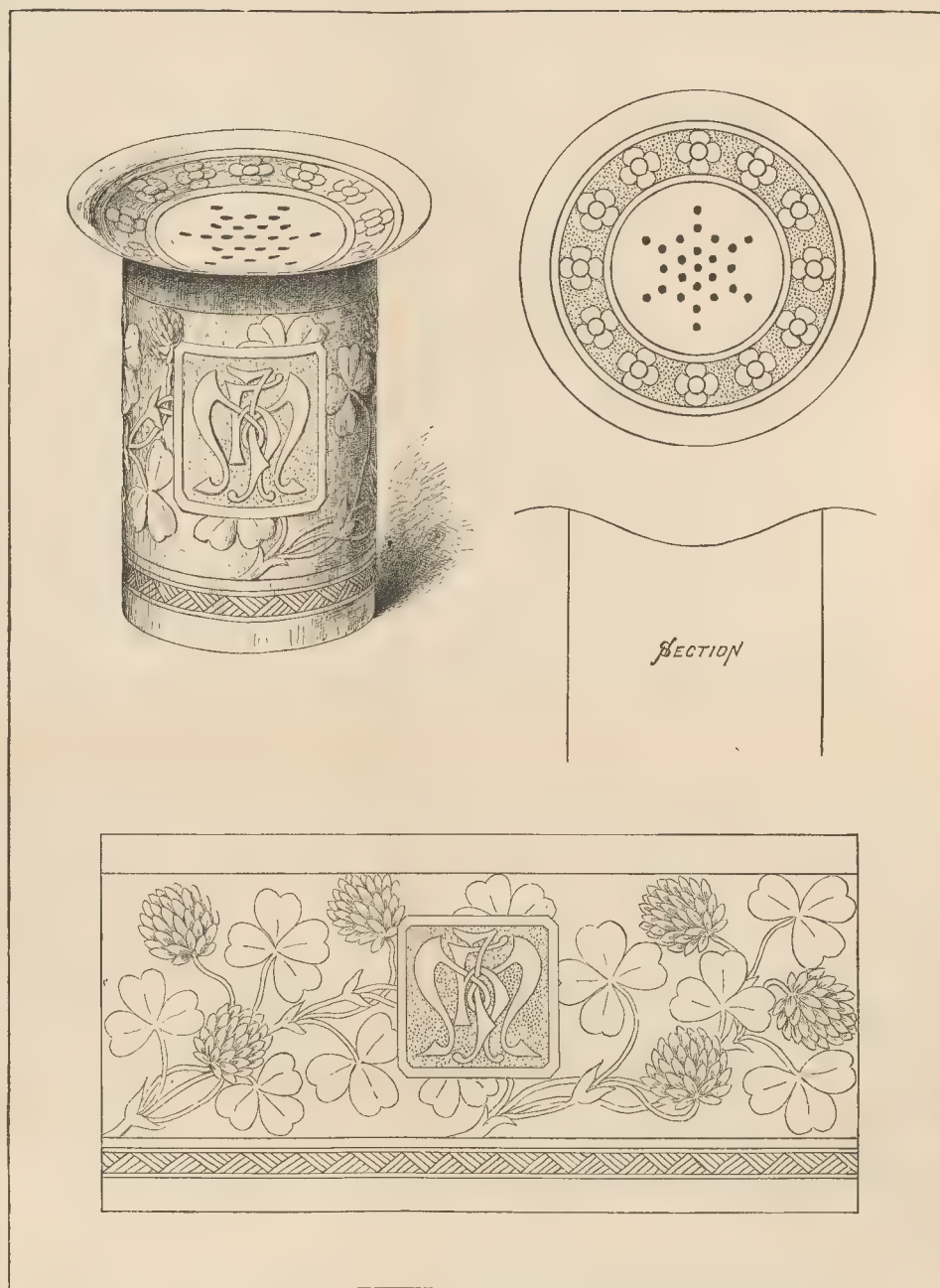
Back of
Foldout
Not Imaged

Plate I.—Full-size Designs for Repoussé Metal Work.



REPOUSSÉ BRASS SCONCE FOR CANDLESTICK.

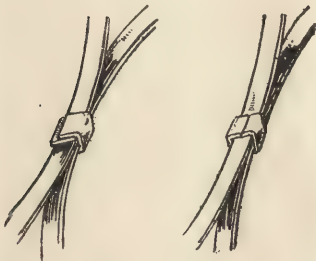
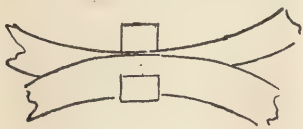
The metal is to be turned up at the dotted line



REPOUSSÉ BRASS OLD-FASHIONED SAND-BOX, FOR DRYING INK

BENT AND LIGHT WROUGHT-IRON WORK.

PROBABLY there is nothing in artistic metal work for the amateur which offers a more easy and attractive field than bent-iron. The outlay for tools and materials need be but trifling. Besides a vice and a small block of iron, which will serve as an anvil, you should have a pair of metal-worker's shears, two pairs of pliers—one "round-nosed," one "long-nosed"—a table vice, to fix on the edge of the working-table, a bottle of black varnish and brush, a tape measure, some narrow strips of sheet iron and wire for binding it. The wire used by florists for *boutonnieres* will do for most purposes.



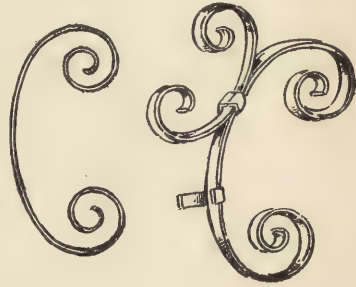
FIGS. 237-239.—METHOD OF BINDING THE BENT-IRON STRIPS.

The light strip iron may be had $\frac{3}{16}$ in., $\frac{1}{4}$ in., or $\frac{3}{8}$ in. wide, and about $\frac{1}{32}$ in. thick. Strips about 12 in. long and not more than $\frac{1}{4}$ in. wide are the most generally useful. Even the lightest strips are very strong, and are best to use for suspended objects. For standing objects, where rigidity is necessary, the thicker kind is used, and sometimes a rod of iron is twisted up with it to support it properly. The metal should be neither very flexible nor very stiff; it should bend easily and uniformly, and, once bent, should retain its shape.

The round-nosed pliers are used for bending; the long-nosed sort for clinching the small strips which hold the curves together. The small vice is needed for bending stronger strips at right-angles, one end of the strip being screwed between the jaws of the vice, so that the other end may be hammered into shape. It is also useful in making spirals. The tape measure is used for determining the lengths of sym-

metrical waves, and the shears, of course, for cutting the strips to measure.

In bending, take the strip of iron in the left hand, the round-nosed pliers in the right, and bend slightly the extreme end of the strip. It is important to gain a true curve at the very beginning. The pliers should slip slowly along, bending the iron evenly at all points. If an angle is unluckily made, it can be reduced by using the long-nosed pliers. When two curves are



FIGS. 240, 241.—CURVES IN BENT-IRON WORK.

finished, they are connected by means of a small binding piece, as is shown in fig. 129. The strips may be fastened so that one end laps over the other, which makes the stronger joint, or end to end, which has the neater appearance. The curves may be temporarily fastened to a frame by wire to get them properly arranged before binding. When the articles are finished, two coats of black varnish should be applied to prevent rusting. Design No. 230 shows a visiting-card holder intended to be fastened to the front door. The angular frame is to be first made, the corners being bent, as above explained, in the vice. It may be made in two pieces, to be connected by a binding piece, which must also aid to hold the curved strip next it in place. Every curve should be applied to the drawing or to a tracing laid flat upon the table to make sure that it is correct. It will save much time and trouble if when the first curve of a pair is formed the tape be used to take its measure, so that the next piece may be cut of the same length. In many patterns the same curve is



FIG. 242.—LONG-NOSED PLIERS.

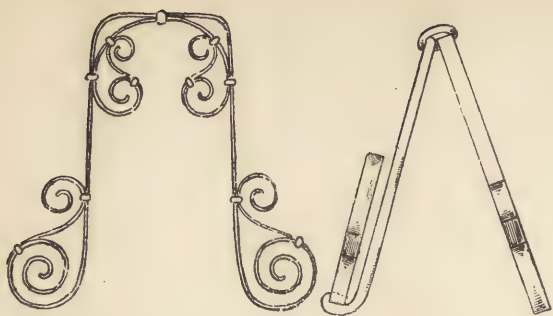


FIG. 243.—EASEL FOR THE MENU STAND.

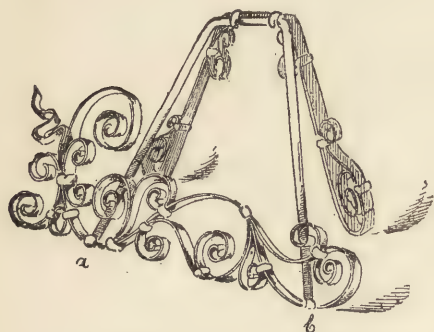
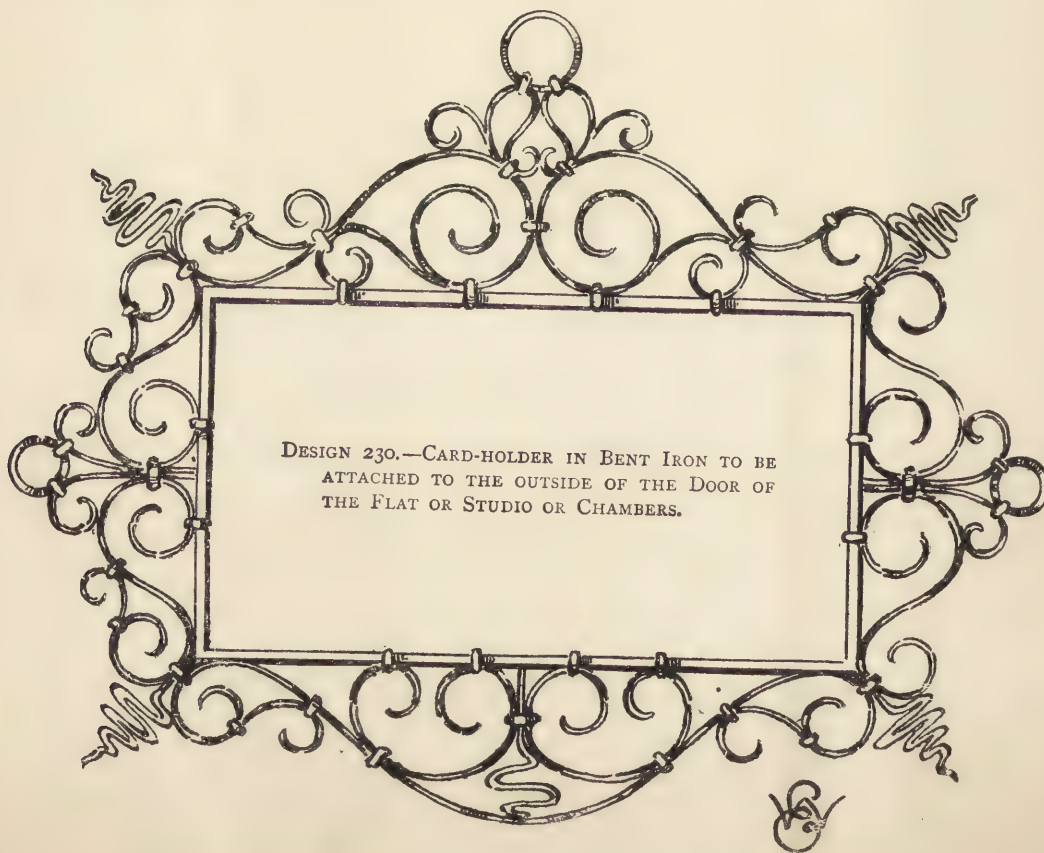


FIG. 244.—PERSPECTIVE VIEW OF MENU STAND.



DESIGN 229.—MENU STAND IN BENT IRON.



often repeated, and accuracy and method in this respect are of the first importance; for if the scrolls are not of equal size and all bent true to the drawing, it will be impossible to finish the piece. For this reason the several pieces should be placed together on the table before binding, when any inaccuracy will at once appear, and can either be corrected, or if that be impossible, the erring scroll or scrolls can be replaced by others properly bent. When fastened together and varnished, the piece must be laid aside to dry. A piece of stiff cardboard is to be fastened to the back of the frame, so that the visiting cards can be slipped between it and the frame itself.

The neat little contrivance for holding a watch (design No. 232), does not require special comment. The longer horizontal strip may be made slightly concave, the better to support the back of the watch. Fig. 250 shows plainly the hook by which the watch is to be hung.



FIGS. 245, 246.



FIGS. 247, 248.

thing. Each iron strip must be bent most carefully to form the curves, and they are all to be connected at the places shown in the illustration by small binding pieces, as already explained. Having completed the menu stand, prepare the easel for it. To make a slip and rest for the card, take a *round* iron wire and bend it to the shape shown in fig. 244. The ends of this wire should be bent round points *a* and *b* of fig. 244 (see also side view, fig. 243); and the rest should then be formed in such a way as to give enough space for a card to slip between it and the front part. The stand will be finished by connecting the easel with the top of the frame by means of wire.

Design No. 233 suggests a treatment for a candlestick. The materials are some sheet iron, an old tin candlestick, and a few pieces of iron wire about one-eighth or three-sixteenths of an inch thick.

First rip the bottom from your old candlestick, and in its place fasten a funnel-shaped form of thin sheet iron with a piece of stout wire projecting down from the bottom of it to fasten the bottom part of the scroll feet to. Bend three sets of scrolls the desired size to form the legs, and bind these to the candlestick with iron wire.

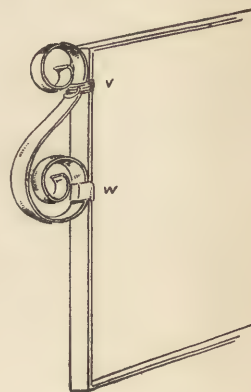


FIG. 249.—SIDE VIEW OF THE CARD - HOLDER (Design 230).

Design No. 235 affords a suggestion for a collar or cuff box. Six hoops should be made of round iron wire or square iron one-eighth of an inch in size—one from the bottom, one from the top, and four for the cylinder.

The bottom may be of thin wood bound with one of the rings and made fast to the lower edge of the cylinder. The top should be fastened to the upper edge, with one piece of ribbon to act as a hinge; opposite the hinge may be a bow to act as a handle to lift the cover up. The interior of the box should be lined with silk of some bright colour, against which the black iron scrolls will form a pleasing contrast.

Design No. 234 suggests a pretty idea for decorating the upper part of a doorway. Some doorways are so high that to place a curtain pole close under the soffit of the door frame and hang a curtain from it would give it a very long and drawn-out appearance. This undesirable effect can be remedied by placing a pretty wood or metal grille in the upper part of the doorway and fastening the curtain pole directly under it, from which the curtains may be hung.

To make a grille similar to the design shown requires a few hours of patient work, and but a small outlay for materials. It is always best to work out on a smooth-top table an object of this character. The full-sized detail should be drawn out on a piece of smooth brown paper, and as this is to lie flat on the table, it is an easy matter to bend each iron scroll to conform with the lines of the drawing.

Design 236 represents a grille for a window or top part of a front door having a plate of clear glass. The outside frame should be of stout iron, perhaps one-sixteenth of an inch thick by one-quarter of an inch wide. Bend this at the corners, so that it will fit inside the style of the door or window in which it is to be placed. Allow it to be one-sixteenth of an inch smaller all around than the style, so as to make room for the bits of iron that will wrap around it, which are necessary to hold the whole in place. It is best to lay the frame down on a smooth-top table over a piece of brown paper free from creases or wrinkles, and mark with a pencil the size of the frame; then sketch in the full-sized

design as you would have the finished grille. On this plan you can bend and fit each scroll in place, and when you have worked out the entire design in iron begin to fasten the pieces. When fastening the rings to one another, always clamp the little piece of fastening iron so that it will hold the ends of the hoop and also hide the joint, thus making it appear to be a jointless band of iron.

The iron used in making these scrolls may be bought at the ornamental iron-worker's. It should be cut in strips about one-quarter of an inch wide, and in that shape it can be more easily bent. It is generally best to use an old pair of gloves or fingers of gloves when bending the strips of iron, as otherwise the ragged edges may chafe the skin, especially if the hands are soft or tender.

All articles that are of iron and that are to be black should be painted with a good and lasting coat of lead black.

If your iron-work is to be exposed to the weather, it is best to give it a coat or two of red lead thinned with oil. This is a good waterproof

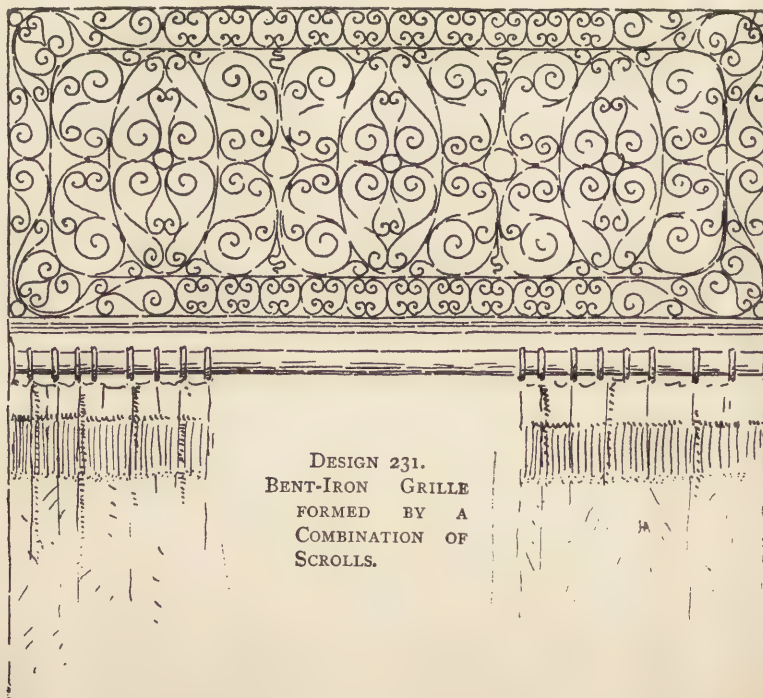
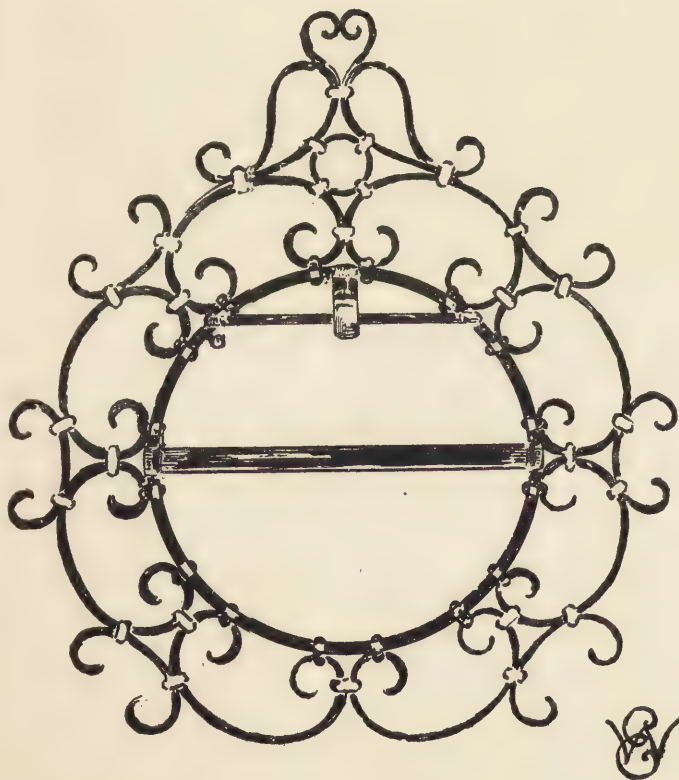
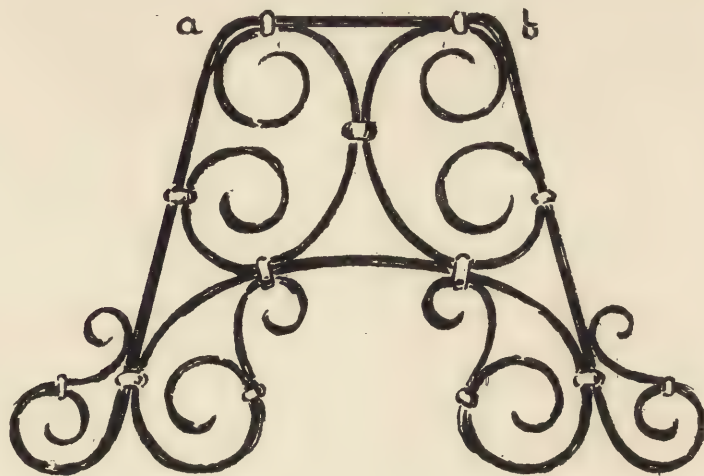
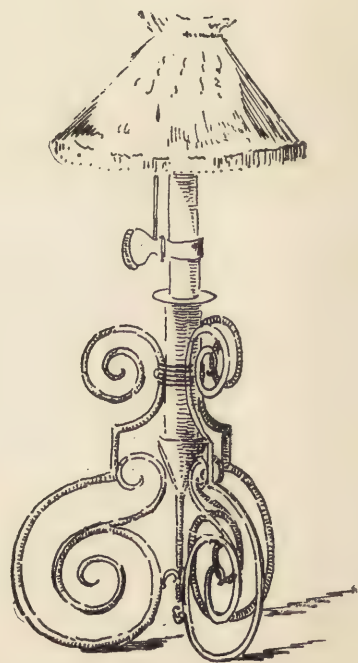




FIG. 250.
HOOK FOR
THE WATCH.



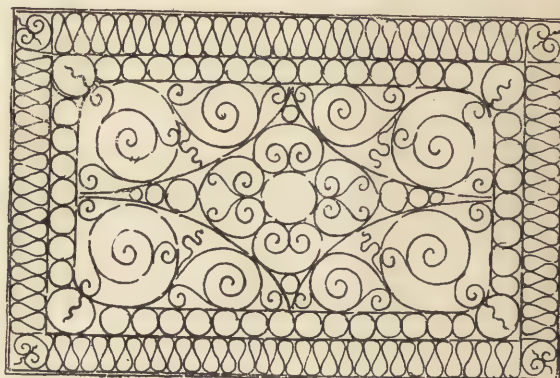
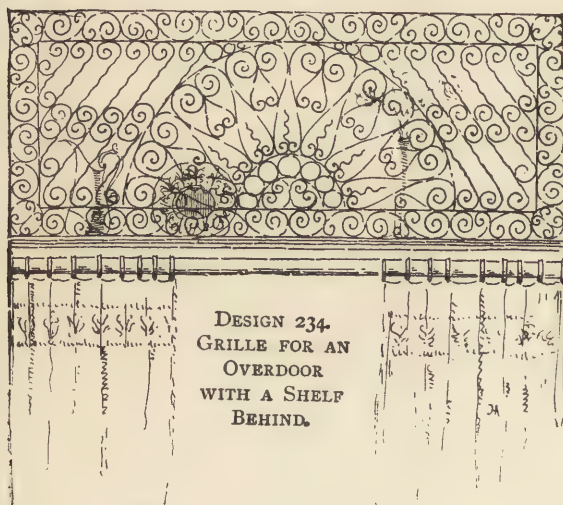
DESIGN 232, 232A.—WATCHSTAND AND BACK IN BENT IRON.



DESIGN 233.—CANDLESTICK MADE
OF SHEET IRON AND IRON WIRE.

coating for metals that rust or corrode, and over it several coats of black may be placed to advantage to insure your iron against rust.

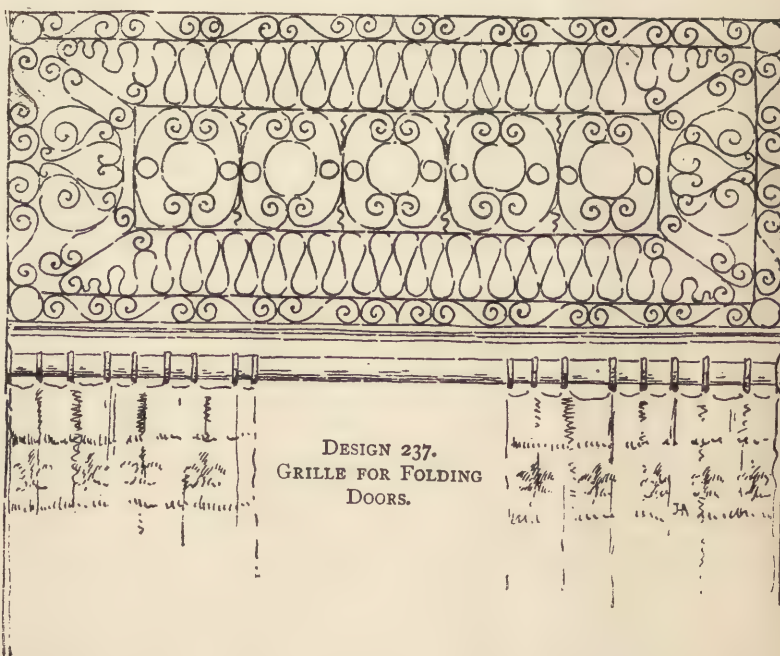
experience, however, you need not be afraid to undertake it. Get a small "fairy lamp" of pressed glass, showing bright colours, and



DESIGN 236.—GRILLE FOR A STREET DOOR.

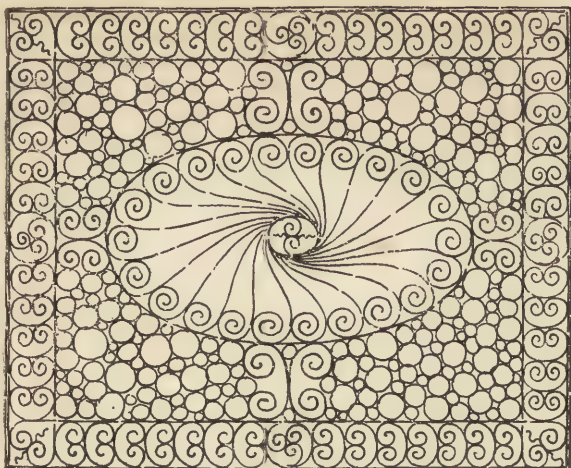


DESIGN 235.—COLLAR- OR CUFF-
BOX OF BENT IRON OR IRON
WIRE.



Design No. 240, representing a hanging lamp, is perhaps more difficult to make than any object we have yet mentioned. After some

prepare the frame work for it as follows: Bend an iron strip to a complete circle, fitting it around the step of the glass at the point



DESIGN 238.—BENT IRON GRILLE.



DESIGN 239.—SIGN BRACKET. FOR COTTAGE OR FARMHOUSE.

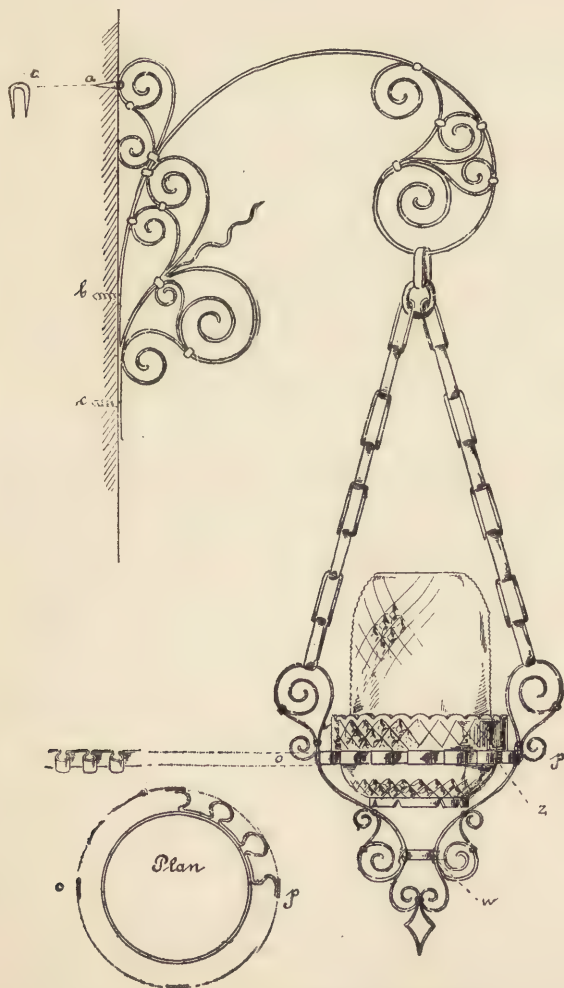
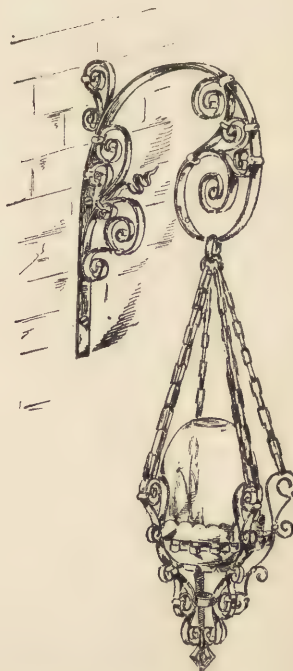


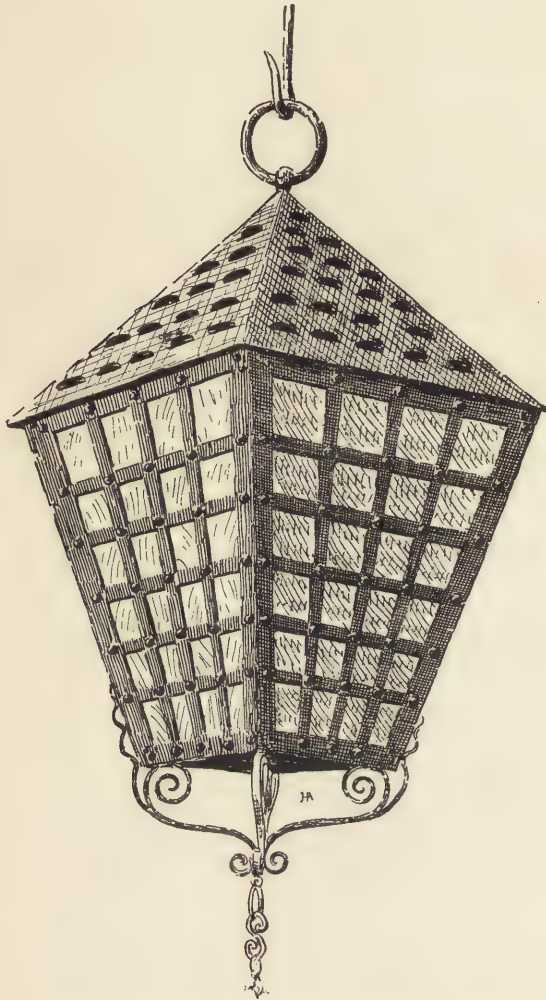
FIG. 251.—DETAILS OF THE HANGING LAMP.



DESIGN 240.—HANGING LAMP (PERSPECTIVE VIEW).

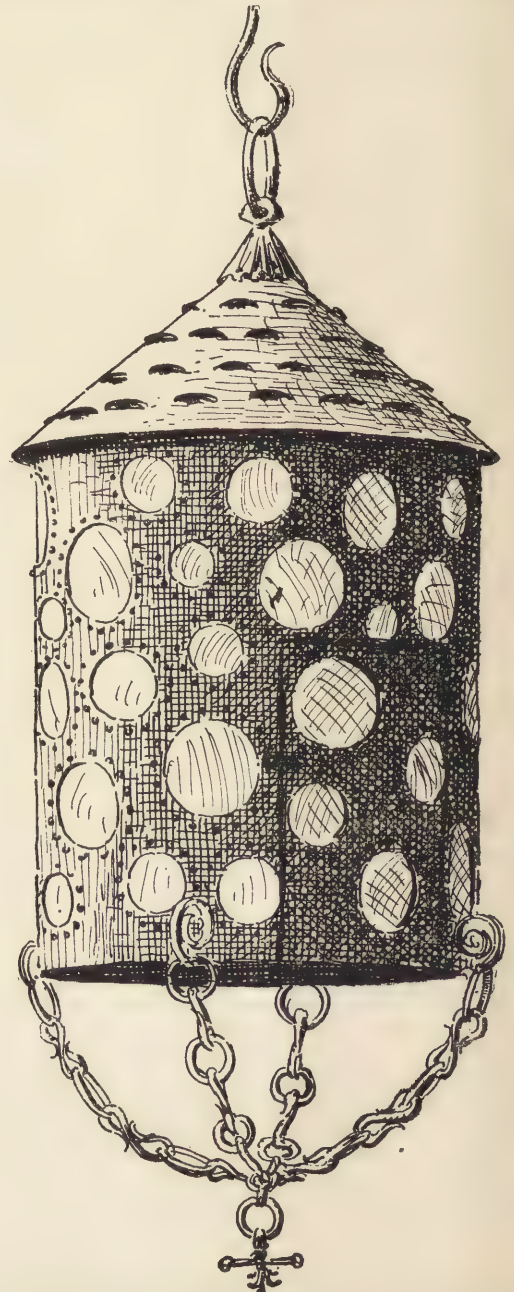
marked *z*, but not too tightly, allowing space enough for the curves shown in the plan and

with binding wire to the circular band of iron shown at *w*. The main curve of the bracket



DESIGN 241.—HALL LANTERN IN SHEET AND BENT IRON.

at *o p* to fasten them by flat binding pieces to the circle. To allow for these curves, take a sufficiently long strip of iron. Fasten the curves to the first-made circle, and be sure that the glass fits into it. Before proceeding further, satisfy yourself that you have finished this part of the work properly. The next step is to form the four large curves to which the chains are to be fastened. Two of these are shown in fig. 251. The four curves must be connected at their base



DESIGN 242.—HANGING LAMP IN THIN SHEET IRON AND IRON WIRE.

which holds the lamp should be rather thick, and not too flexible. Before fastening the

smaller curves to it, prepare two holes at *b* and *c* as entrances for nails or screws, to attach the bracket to the wall. For point *a* take a double-headed nail (*d*), as it would be difficult to handle a screw-driver at this point. The making of the four chains will not be difficult if you have followed exactly the suggestions heretofore given.

Design No. 242, when worked out in thin sheet iron, some round iron wire, a few pieces of mica, and a little perseverance, produces an old-fashioned hanging lantern. Form a cylinder of sheet iron, about eight inches in diameter by twelve inches high. Before riveting the edges together, lay the sheet out flat and cut round holes all over the surface, and to the inside fasten thin discs of mica, such as is used for doors of stoves. This fastening process will require care, and is a little tedious.

Lay the iron down on a piece of heavy board, having one of the discs of mica under the hole with half an inch of margin all around. With a light hammer and a sharp-pointed awl punch little holes around the edge of the hole in the iron, and, with some small, oval-headed copper tacks, rivet the mica fast to the iron. Repeat this until you have closed up all the holes; then cut out a door four or five inches wide by eight inches high, and roll your sheet in cylindrical form again; rivet the two edges together with copper tacks, and fit the door in place with two small sheet-brass hinges; place a catch on the opposite side of the door, and the body of your lamp is complete. Next make a conical top by rolling a sheet of iron into the proper form; a good pattern may be made first by using a piece of stiff paper, and

when the desired shape is obtained, cutting the iron into the same shape. Make crescent-shaped cuts all around the top, as shown in fig. 245, and bend the little ears in to allow a vent for the lamp or candle (fig. 246). Do not bend these little ears down until you have riveted roof or cap together at the edges, otherwise you cannot bend it to form an even round top. Fasten the top to the cylinder with little pieces of L iron riveted to each. The inverted funnel-piece at the top of the lamp, into which the suspending ring is fastened, is a disc of iron frilled into the funnel form and riveted to the top of the roof (figs. 247 and 248). The bottom of the lamp is a stiff piece of sheet iron, with a few small holes punched in it to allow a draught to the lamp. The chains are bent from pieces of iron wire, and are held in place by four scroll-pieces riveted fast to the bottom. All the iron parts should be painted black, and a pretty effect may be lent to the glass by tinting it different colours.

Design No. 241 is for a hanging lantern for a hall; the sides are of sheet iron, with the square holes cut out; or it may be constructed of iron bands, riveted in place with large-headed copper tacks. Small pieces of mica may be used in each opening, or a single large pane of glass that will fill up one whole side. A good height for this lamp is from sixteen to twenty inches from the bottom to the top, not including the ring or scrolls. The scrolls should be made of iron about one-sixteenth of an inch thick and three-eighths of an inch wide. The lantern should be so constructed that one side will act as a door. It should be fastened at one edge with two hinges, and at the other edge a catch should be placed.



APPLIED DESIGN.

PREPARATORY STUDY.

THE elements of Design are form and colour, and these must be combined in accordance with the principles of harmony and symmetry; or,



FIG. 252.
ELEMENT.



FIG. 253.
UNIT.



FIG. 254.
BORDER.

as in the case of many Japanese designs, balance may take the place of symmetry.

Symmetry is a repetition of parts. The part which is repeated is an Element (fig. 252).



FIGS. 255, 256. —EXAMPLES OF SIMPLE BORDERS.

When an Element is once repeated, or balanced, it is called a unit (fig. 253). By repeating the unit in different ways, as horizontally, vertically, or about a centre, to cover a given space, you



FIG. 257. —ANCIENT EGYPTIAN BORDER (PAPYRUS).

produce a design. Horizontally or vertically repeated, it becomes a border (fig. 254). Repeated about a centre, it produces a rosette (fig. 258). Units or rosettes repeated vertically or horizontally produce all-over or diaper patterns (p. 329).

An Applied Design is a design made for

some particular purpose: for instance, for a wall-paper, a carpet, an oil-cloth, a china vase, a stained-glass window, or a book-cover. It must be specially suited to the particular purpose and the particular material for which it is to be used.

"Can I prepare myself to become a designer by studying at home?" is often asked. The answer is decidedly in the affirmative.

Let us take the one branch, the making of designs for silk manufacture. Floral patterns are always most desirable for these; therefore the first thing to do is to get an extended and thorough knowledge of all flower forms. Here is where your education can begin at home. If you live in the country, so much the better, because you are more likely to have opportunity for the study of flowers which best lend themselves to graceful effects. Wild or single

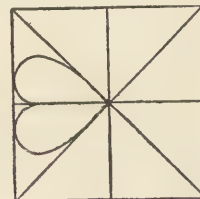
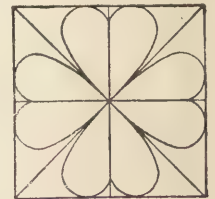


FIG. 258. —A UNIT REPEATED ABOUT A CENTRE, BECOMING A ROSETTE.



blossoms are the ones which adapt themselves most readily to the uses of fabric designs. Always begin with simple flowers. Draw carefully, and with great fidelity to nature: Be just as careful, in drawing a flower, to get the exact proportions as you would be if you were drawing from a cast or a model. Do not be afraid that this extreme care will make your work stiff or finicky—dash and freedom of expression will come later.

In drawing a plant, study every distinguishing point from its cradle to its grave. Of course, you understand you are to draw the entire plant—leaves, branches, and all. Take



FIGS. 259, 260.—RUE ANEMONE AND VIOLETS.

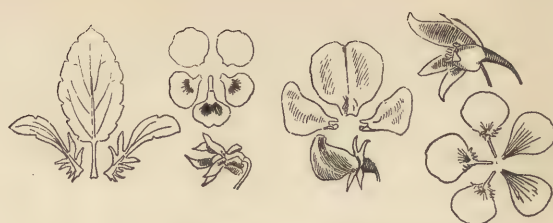


FIG. 266. FIG. 267. FIGS. 268, 269.
ANALYSIS OF THE PANSY, SWEET PEA, AND NASTURTIUM.



FIG. 270. FIG. 271. FIG. 272.
ANALYSIS OF THE VIOLET, RUE ANEMONE, AND PHLOX.



FIGS. 261-265.—SWEET PEAS AND NASTURTIUMS.



FIG. 273.—PANSIES.



the young plant, when the buds are just starting; draw it again when it is rich in flower and leaf; and again when the seed-vessel is forming or has matured. The seed-vessels are often very beautiful things in design. In drawing a flower, sketch it from different points of view—full face, profile, three-quarters, back view, or from any angle your ingenuity may suggest; besides being good training for your

being. For instance, there are the plants that follow a perpendicular growth, like the lily family. You will notice that they never grow in any other way, and when you come to put them into a design, you will know the nature of the plant too well to distort it into fantastic curves; you will preserve its leading characteristics. Again, some plants follow a lateral growth. In this case, the way in which the



FIG. 274.—ALMOND BLOSSOMS. NATURALISTIC TREATMENT.

eye and hand, you will find that a knowledge of all these forms will be useful later on. Draw all kinds of foliage with the same tender care. You know what charming designs have been made from the fern, the ivy, the maple, the Virginia creeper, and many other simpler leaf forms. You cannot tell what possibilities you may yet discover in leaves.

Follow the lead of a plant in studying it. A plant has as much character as a human

branches start and the curves they take should be carefully studied. Then there is the clinging, irresponsible plant, which, like some human beings, clings to a support and follows the line of least resistance. This is true of most vines, though each vine has a different way of clinging—a sort of individuality of its own.

It is well to first draw your plant as a whole. Then draw the flower in a dozen different positions. Make separate studies of leaves in

different sizes and stages of growth. Be very particular about the ends of sprays. It is well to make distinct studies of these.

Do not shade your drawings until you can draw the outlines well. If you cannot draw correctly the beautiful curves in which all plant life abounds, first work long and patiently at the outlines before doing anything else. When you come to shading, block the shadows—that

will all be found useful for reference when you come to apply these forms. Make innumerable drawings of plants, keeping the parts of each one together; you cannot have too many of these studies. If you cannot get just the flower that you want, take anything you can find, and whatever is nearest you. When you draw a separate spray, take that which is most graceful or characteristic.



FIG. 275.—ALMOND BLOSSOMS. SEMI-CONVENTIONAL TREATMENT.

is, put in masses of shading, without any half-shadows. You will see the reason for this when you begin to apply the plant to practical design.

Brown wrapping paper of ordinary quality is as good as anything to draw on; it makes a pleasant background and takes the pencil well. It is advisable to follow a uniform size for your sketches, for the better means of preserving them. Keep every one of your studies; they

Another branch of study which can be followed at home, and which is of great importance, is a knowledge of the literature of art. The best artists are broad in their culture. Make yourself acquainted with the styles of designing that belong to different countries and periods. Take up the epochs in art that are famous. Try to find the leading characteristic of this particular style of art—for instance, the art of Italy during the Renaissance. The wood



FIG. 276.—ANALYSIS OF THE FLEUR-DE-LIS.

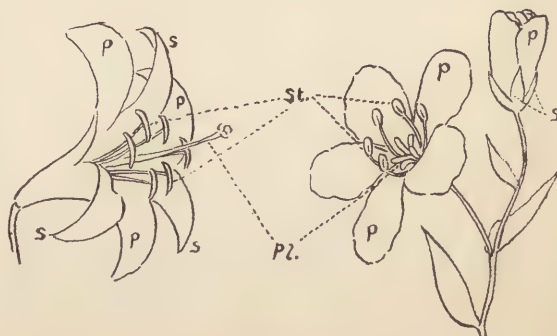
FIG. 276A.—THE FLOWER. NATURAL GROWTH.

FIGS. 277, 278.—SWEET BRIER.
(Natural growth; but slightly arranged for decorative effect.)



FIG. 279.—DIAGRAM, EXPLAINING SOME BOTANICAL TERMS.

The letters "P," "S," "St," "Pl," stand for Petals, Sepals, Stamens, and Pistils. Other common terms are as follows:—*Anther*, the outer part of a stamen; *Axil*, the angle between a leaf and the stem on the upper side; *Axillary*, situated in an axil; *Bracts*, the leaves of a flower cluster; *Calyx*, collectively, the sepals; *Corolla*, collectively, the petals; *Corymb*, an unevenly branched flower cluster whose outer flowers open first; *Cyme*, like the corymb, except that the inner flower opens first; *Involucre*, a set of bracts around a flower cluster; *Ovary*, the seed-vessel; *Pedicel*, the footstalk of each separate flower of a cluster; *Peduncle*, a flower-stalk; *Perianth*, collectively, the calyx and corolla; *Petiole*, the footstalk of a leaf; *Pistil*, the seed-bearing organ of a flower; *Sepal*, a leaf of the calyx; *Serrate*, saw-toothed; *Sessile*, sitting, having no footstalk; *Stamen*, an anther and its support; *Stipules*, leafy appendages at the base of a leaf-stalk.



carvings, stone, and metal work of this period are rich in suggestions. It is astonishing how marked is the difference in taste of different nations, and how distinctively this taste has found expression in each nation's art. Every one has some peculiar virtue for which it is worth studying. Even the most primitive art offers suggestions of value. What a field, for instance, Celtic art alone opens for suggestion in modern design!

When you have acquired some knowledge of the literature of art and a good deal of geometrical and plant and other natural forms, take up the study of ornamental construction with Mr. Lewis F. Day's "Anatomy of Pattern" (B. T. Batsford, publisher, 52, High Holborn). Follow with Mr. Gleeson White's "Practical Designing" (Geo. Bell & Sons, York Street, Strand), an invaluable collection of professional hints by specialists, for the preparation of working drawings so that, technically, they would be acceptable to manufacturers of wall-papers, carpets, floor-cloths, woven fabrics, pottery, metal work, stained glass, and bookbinding. Intelligent assimilation of the contents of these two little volumes will be the best possible substitute for that practical knowledge of the application of design to manufactures which, in certain branches, can only be acquired through actual connection with the factory.

NATURAL AND CONVENTIONAL ORNAMENT.

PRACTICAL knowledge of the application of design to manufactures, as we have remarked, can in certain branches only be acquired through actual connection with the factory, and the wise student would gladly avail himself of any opportunity leading to that end, no matter how humble might be the capacity in which he might find employment. But it is not there that he need expect to learn Design.

What is called designing in most factories, and even in most schools where they pretend to teach design, is simply the adaptation of

old ideas to new requirements, a work which certainly calls for judgment and taste, but which is not original design. The problem usually set before a designer is, given a certain space, to decorate it in a given style, and his way of setting about it is simply to turn over a book of plates or photographs and see what he can take from this and what from that. Of course, there is not much room for originality, nor consequently for any real interest in such work; and when repeated, as it is, with mechanical exactness and without limit, it is hardly wonderful that so much of it should be found more tiresome than the blank spaces that it is supposed to decorate. But amateurs go too often to the other extreme, and, tired of the mechanical repetition of known forms, copy Nature in all her irregularity. The middle way is the right way.

A geometrical groundwork is the common element in all good design. More than this, geometrical—that is, regular—forms by themselves may produce very fine designs; irregular forms will not, unless they are regularly disposed. This is not, as is sometimes stated, a result of technical conditions. It is a taste which is common to all humanity; for it may be laid down as a rule that, other things being equal, we all prefer regularity to irregularity and order to disorder. The aim of all art—in fact, even of the most naturalistic—is to accent and bring out the order that we find in Nature.

The first thing for the young designer to do, then, is to work out in the proper materials simple geometrical designs. That will teach him their great decorative value, and give him a training which will always be useful.

When he has made himself familiar with the beauty that may be got out of simple combinations of squares and circles, stars and crosses, and the like, he may look for something of the sort in Nature, and he will find hints of it on every hand in the utmost abundance and variety, but very seldom, indeed, more than a hint. All low-ground plants and most free-growing twigs, when looked at from above, show as crosses or stars or rosettes of leaves, but all more or less irregular. But

in reducing these forms to ornament it will be found best to stop short of absolute regularity, for it gives an additional pleasure to preserve something of the play and freedom of the natural form.

This brings us to the consideration of what is meant by conventionalising. The term may be defined as the making of an ornament from a natural form, without destroying the identity of the form itself, the less important features being subordinated to the limitations of the material to be decorated.

In each handicraft conventionalising has its peculiar limitations and differences. The treatment demanded in one case may be improper, or, at least, undesirable in another. For instance, the worker in *cloisonné* enamels of necessity outlines his design with a clearly defined line of metal; but it does not follow that



FIG. 280.—WILD ROSE. DECORATIVE, BUT NEARLY NATURAL TREATMENT.



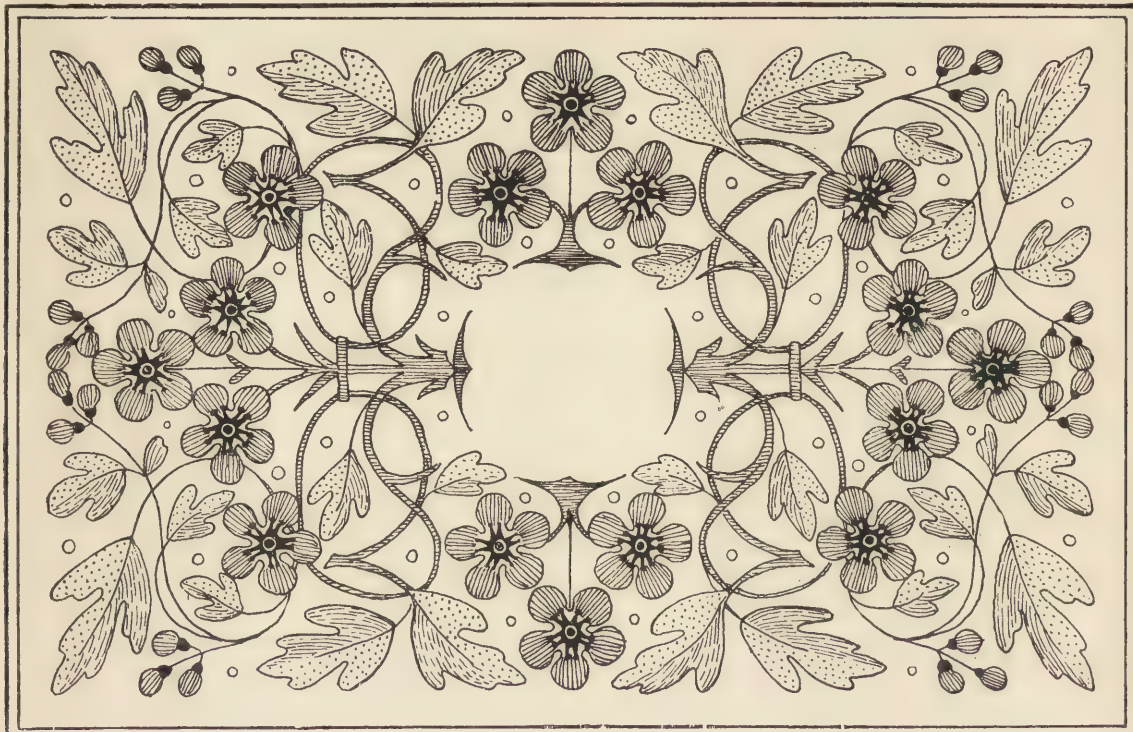
FIG. 281.—NASTURTIUM AND LEAVES. DECORATIVE, BUT NEARLY NATURAL.

the china decorator should imitate him with a line of colour, such as is often seen in the work of more than one pottery of reputation. There are, of course, cases where a clearly defined outline, of more or less delicacy, is necessary to give relief from the background and add character, where the worker is denied the many helps of light, shade, and colour, which would be available in a more pictorial treatment. As we have said, the line of the *cloisonné* workman is a necessity; there is an apparent reason for its being, as there is for the decorative lead lines in painted glass and the "couched" outline in embroidery.

A semi-conventional arrangement of some flower or shrub retaining its more essential characteristics is apt to be more beautiful than the severely conventional

treatment of the same motive would be, and at the same time conform to all technical requirements. The two treatments of the almond-blossom (figs. 274, 275) illustrate this point. The first is a free-hand sketch indicating, so far as composition is concerned, no special thought beyond the limits of the surface to be covered. Its beauty would

its unpretentiousness; but such a decoration is very attractive when the coloration follows pretty closely that of nature and the conventionality is confined to general outline and background. Such a painting painted on porcelain, for instance, would be suitable for a door-panel or a cabinet, a position that would destroy the beauty of the first because of the



DESIGN 243.—THE HAWTHORN. CONVENTIONAL TREATMENT. ESPECIALLY SUITABLE FOR PYROGRAVURE.

It will be observed that this design is equally available used vertically. It was originally intended for a book-cover decoration.

depend principally upon the skill with which it is coloured and the plant imitated. If a masterly bit of flower-painting, it would deserve the best light and position in the room, and should not be relegated to fill an obscure corner which would be as well supplied by such a panel as the second. The latter shows an artificial or conventional arrangement of the same plant forms. It might be painted in monochrome and still be pleasing, because of

ever-changing light that would be thrown upon it.

That it is possible to depart much further from natural form without sacrificing the beauty of the motive is well illustrated in the four different treatments of the hawthorn blossom shown on pages 121, 122, 123, and 137, although in the final example the limits of conventionalisation may be said to be well nigh reached.

THE CONSTRUCTION OF ORNAMENT.

MR. DAY observes that the popular idea of the process of ornamental design is that the artist has only to let his hand crawl over a piece of paper, and, like a spider, spin out the fancies that may crowd his fertile imagination.

school, from the set details of the classic to the luxuriance of Arabic ornament, from the stiff simplicity of savage pattern to the intricate naturalistic decorations of Japanese art, is and must be built up upon a geometrical framework.

Through the courtesy of his publisher we are allowed to reproduce some of Mr. Day's ingeni-



DESIGN 244.—THE HAWTHORN. CONVENTIONAL TREATMENT. SUITABLE FOR PYROGRAVURE, GESSO, AND WOOD-CARVING.

This design, like the preceding one, is equally available used vertically. It was originally intended for a book-cover decoration.

He shows that, on the contrary, "ornament is constructed patiently, built up on lines inevitable to its consistency—lines so simple that to the expert it is not difficult to lay bare its very skeleton; and just as the physiologist divides the natural world, according to anatomy, into families and classes, so the ornamentist is able to classify all pattern work according to its structure, and to point out how few are the varieties of skeleton on which all this variety is framed." For all repeating pattern of every

ous demonstrations of "The Anatomy of Pattern."¹ (See pp. 124, 126, 127.) In this treatise the number of skeletons revealed and shown to underlie the whole mass of repeated patterns is singularly few. The stripe naturally comes first, with its near kin the cross line, yielding various checkers, and by simple steps all the different frets and lattices, interlacings and traceries, founded on parallel lines

¹ "The Anatomy of Pattern," B. T. Batsford, Publisher.

crossing each other at right angles, or diagonally. Because almost always, in the case of manufactured articles, a repeated pattern is

it might easily be inferred that all repeated patterns are based upon squares like those of a chessboard ; but, as we discover later on, the



DESIGN 245.—THE HAWTHORN. CONVENTIONAL TREATMENT. ESPECIALLY SUITABLE FOR PYROGRAVURE.

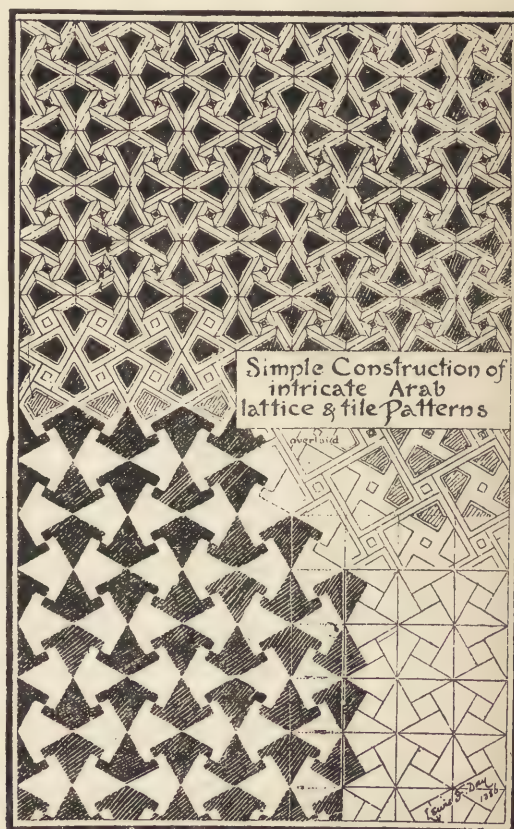
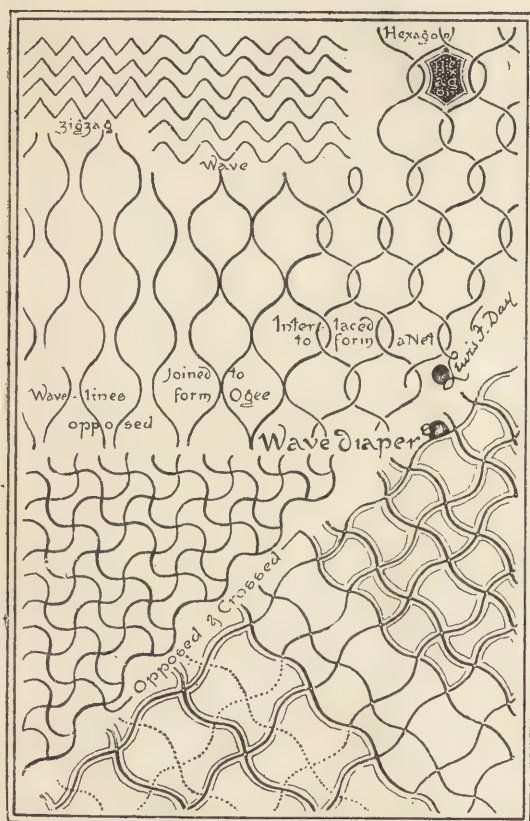
printed from a square block (or the surface of a roller which is practically the same shape, or else woven into a square piece of the pattern,)

diamond so nearly allied is even more powerful ; for it provides the "drop," one of the most valuable devices to avoid the too obvious

monotony of a series of checkers. The diamond again is further elaborated by cutting it in half; whence we obtain the triangle, with the nearly related hexagon on which is built the whole of the honeycomb ornament.

So far we have considered skeletons based upon straight lines only. But even with these we have already the basis of that infinity of geometric pattern found in Byzantine and

apparently complicated beyond measure: by the logic of actual experiment he proves it to be based upon the diamond, the square, or the interlacing circles. Whether the skeleton of such construction is hidden by overlaid ornament, as in the elaborate patterns of Moorish art, or is merely taken as the groundwork of repeated spots, or as the imaginary centres whence the circles are struck, a few unalterable



FIGS. 282, 283.—DEMONSTRATIONS OF "THE ANATOMY OF PATTERN," BY LEWIS F. DAY.

Moorish decoration. But with the introduction of waved lines, as those in fig. 282, new series of diapers are revealed that in effect, entirely distinct from checker or diagonal lattices, are yet based upon the latter to an extent that is simply surprising when it is pointed out so clearly as Mr. Day, by diagram and comment, has managed to show it in his treatise. Take, for instance, the Arab pattern shown in fig. 283,

plans govern the whole field of repeating designs in all classes of decorative art work.

From the specially shaded parts of the design in fig. 287, we see how a repeated pattern that is a common type of decoration upon all sorts of fabrics may be taken as built either upon the square, the diamond or the oblique diamond, and yet in each instance be repeated accurately.

The block of twenty-one inches is generally adopted as the standard for all printed fabrics and wall-papers. With this inflexible size there are some startling limitations. For instance, the hexagon can only be applied to such a square on a very small scale. As Mr. Day remarks, "If you made your hexagons touching in honeycomb fashion ten and a half inches wide, so as to get two in the width, they would not come true in length; they would be too long. If you made them true they would not fill the square, but only a space about 21×18 . Three and a half hexagons in the width would work, but only as a 'drop

printing or weaving, and that are to be placed together to fit a given surface, must contain a match and a repeat. A repeat is the pattern repeated. The lower part of the design, where the forms appear to be cut off, must exactly match the forms repeated at the upper part of the pattern. The two parts when repeated, as they are through thousands of yards, must form a perfect whole.

Look at any length of good wall-paper, and you will readily see that the match is so perfect that you cannot discover the repeat. Of matches there are three kinds—"plain," "drop," and "turn-about." A plain match

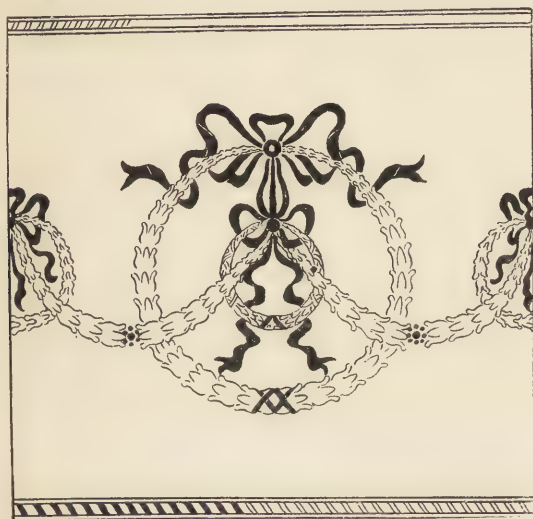


FIG. 284.—A "PLAIN MATCH" (FOR A FRIEZE).



FIG. 285.—A "TURN-ABOUT MATCH."

pattern' that would give hexagons of six inches across. In order to occupy the square with true hexagons, repeating without a 'drop,' they would need to be reduced to half that size—that is to say, there would have to be seven hexagons to the width, measuring each only three inches across." This one instance "shows how very strictly the artist is bound by considerations which rarely occur to the uninitiated—considerations which have always had a great deal to do with the design of pattern work."

All designs for industrial purposes that are to be applied to the fabric by machinery, by

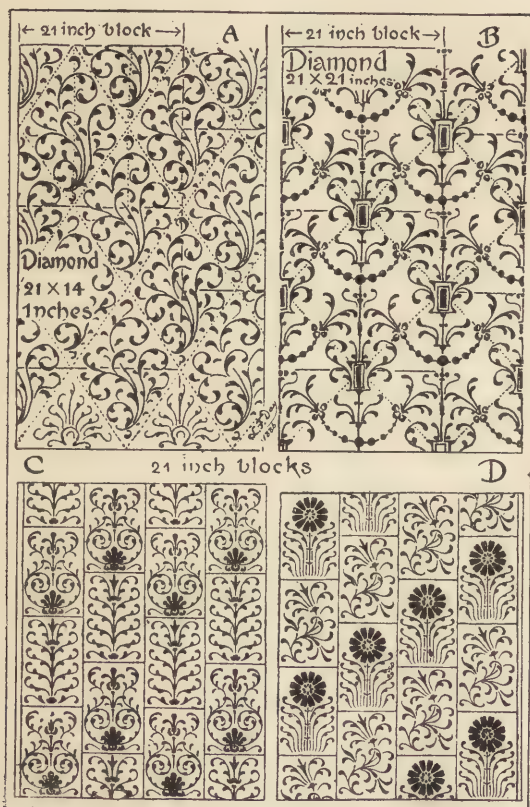
is one in which the two parts of the same figure are directly across the breadth of the paper from each other. This is the simplest form of match.

The "drop" is a device by means of which the designer is enabled, without reducing the scale of his work, to minimise the danger of unseen stripes in the design, a danger which is always imminent when the repeats occur side by side upon the same level. For a design printed or woven in squares obviously must have the pattern so arranged as to correspond precisely with the design upon the other half of the material that is to be

joined to it. In any wall-paper this joint is easily traceable; but by the drop pattern, although the piece of stuff will fit to the side of its fellow, the pattern does not occur exactly on the same level. In the designs on fig. 287 and the upper pair on fig. 286 we see the diamond yielding this drop; in the lower

pattern only six inches square when completed by the machinery is twelve inches square.

How to Prove a Design by refitting its component parts is shown by Mr. Day in fig. 288. The worker is advised not to attach great value to the appearance of the design as a



FIGS. 286, 287.—BY LEWIS F. DAY (FROM "THE ANATOMY OF PATTERN"). ILLUSTRATING THE "DROP MATCH," AND THE EFFECT OF THE DROP, ACCORDING TO ITS LENGTH, ETC.

The right-hand example (No. 287) shows three plans, on either of which the same simple pattern may be produced.

designs of fig. 286 square blocks are so arranged to give the same effect. This feature applies equally to carpets—in fact, to all surface ornament.

In the "turn-about" match (fig. 285) only one-fourth of the pattern is made, and the machine in turning about completes the figure. This is the economy of design, for a

drawing, but to cut it up deliberately and rearrange the parts in order to prove the repeat. This is one of the practical devices that an amateur would be fearful of trying, were it not recommended by one who knows. No amount of accurate measurement can give so certain a result as this cutting up and re-arranging the actual drawing. By this

means you see at once the way each line or curve meets its fellow and how far it disguises the joint which, if allowed to betray itself, ruins the design as a whole.

WALL-PAPER.

MANUFACTURERS, as a rule, prefer simple patterns conventionally treated to floral and other patterns needing many printings. The more colours, or *shades of the same colour*, that are called for in a design, the more printings are required to reproduce that design, and hence, as a rule, the smaller the chance of its acceptance by the manufacturer. In estimating the number of printings required, each shade has to be reckoned as a separate colour, because it calls for a separate printing. A single printing will only give a perfectly flat impression—*i.e.*, uniform in light and shade. The only possible modification of this uniformity is by means of stippling (see p. 61), which breaks the tones of the parts so treated. This device is seldom resorted to except in the case of very cheap wall-papers, and need not be taken into account by the novice in designing.

Avoid the use of pronounced figures and any arrangement that tends to produce the effect of horizontal lines, and remember that although a pattern may be pleasing on a small piece of paper, it may weary the eye and lose character when spread over a large surface like that of a wall.

More than ordinary ingenuity is required for borders, even when not elaborate in design, for they have the disadvantage of perpendicular and horizontal positions. The field, in general colour and arrangement, is like the hanging, but the guards are darker and stronger in colour, and unless they are only bands they are composed of conventionalised leaves or flowers, or it may be of geometrical figures.

Dimensions of a Design.—Almost invariably the dimensions of a design for an English wall-paper are 21 in. \times 21 in., the paper itself being 22 in., the extra inch allowing a margin on

each side for the register¹ of the block in printing, and also as a protection to the edges of the roll.² The space, 21 in. \times 21 in., may be divided into squares of five different dimensions as follows: First, four squares of 10½ in. \times 10½ in.; second, nine squares of 7 in.; third, sixteen squares of 5½ in.; fourth, twenty-five squares of 4½ in.; fifth, forty-nine squares of 3 in. Mr. George C. Haité, in his admirably lucid paper on Wall-Papers, in "Practical Designing," which no student of the subject can afford



FIG. 288.—DIAGRAM BY LEWIS F. DAY, SHOWING HOW TO PROVE A "DROP" DESIGN.

(From "The Anatomy of Pattern." B. T. Batsford, Publisher.)

to miss, points out that these five divisions of the space "would limit the fancy and play of the designer, were it not possible to get over the difficulty by a still further division of the

¹ The *Register* indicates on the paper the limits of a certain colour, upon which the successive printings of the other colours of the design must not impinge. The adjustment of the register in all colour printing must be extremely accurate.

² The length of a roll of wall-paper is twelve yards.

width by means of what is called *stepping*

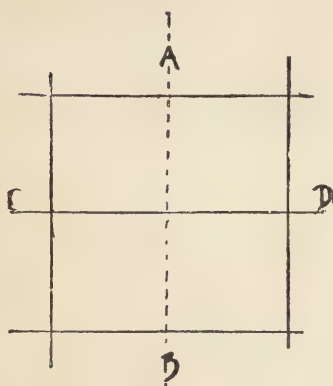


FIG. 289.—THE "REPEAT" PRINCIPLE.

The sides, C, D, must join, and the top, A, must join the bottom, B.

more satisfactory and pleasant in line."

The Repeat.—The principles of the "repeat" and the application of the device of "stepping" are set forth clearly by Mr. Haité.¹ A pattern, he says, "should either boldly declare its repeat, and indeed make a feature of it, or it should not be noticeable at all; and, further, all repeats should be pleasant to the eye, avoiding disagreeable lines, some of which may even make the wall appear out of the upright or undulating. Unless intentional, as a feature of the pattern, it is well to disguise *all* lines. The perpendicular is less objectionable than the horizontal, and the true diagonal line less so than either." A practical explanation of the meaning of "repeat" is given in fig. 289: the sides C and D must join, and the top, A, must



FIG. 290.—THE "REPEAT."

The pattern is cut off at the sides, but fits in top and bottom.

the design—a method which is most valuable and of frequent use; for it is not only that by this means a different *scale* of work is possible, but that by its adoption we are enabled to better disguise the 'repeat' and to render the effect of a mass of 'repeats' covering a large surface

join the bottom, B. The difference between the sides and the top and bottom of a wall-paper is that "on the sides the repeat must be cut off absolutely in a straight line, and join; while at the top and bottom figures—such as a small rosette, a leaf, or centre of a flower—may be allowed to complete themselves, and the top be made to *fit into* the bottom (fig. 290); but in designing it is always desirable to run the drawing over the lines of repeat and make it fit into both sides and bottom, as in fig. 291."

"Stepping" is illustrated in figs. 292, 293, 294.



FIG. 291.—THE "REPEAT."

The drawing is run over the lines of "repeat" and made to fit into both sides and bottom.

"The step is the division of the space into half, and the top left-hand corner, C, is made to join the *centre*, D, on the right-hand side instead of at the top. The ordinary method of repeat would be that shown in fig. 294, but it will be seen that the flowers fall in horizontal lines, while it may be desired that the flowers should form diagonal lines, and at the same time *suffer no loss in scale*. This can only be done by stepping on the sides of the pattern, as shown in fig. 292, and get the result as in fig. 293."

It is always wise to colour designs before offering them for sale, as manufacturers do not like to select from mere sketches. Colour rather more than one complete section, so as to prove the accuracy of the repeat.

¹ We are indebted to the courtesy of the publishers, Messrs. Geo. Bell & Sons, for the use of these diagrams, from "Practical Designing."

TEXTILES—CARPETS.

THERE are three ways of applying a pattern to a fabric: First, by printing the design on the material after it is woven, as in calico, oil-cloth, and linoleum; second, by printing the pattern on the threads before they are woven, as in tapestry Brussels and tapestry velvet carpets; and, third, by taking various coloured threads and bringing

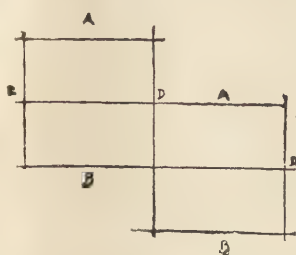


FIG. 292.—THE "STEPPING" METHOD.

them to the surface wherever the pattern requires by means of the Jacquard loom, as in body-Brussels and Wiltons. The great desideratum in making designs to be printed is to use as few colours and make each colour produce as much effect as possible; for the reason that in printed goods each colour introduced calls for a separate block with such parts of the design as employ that colour cut upon it. Each block is an additional expense, and although a calico or chintz printed in seven colours will bring no higher price to the manufacturer than a piece requiring only one, still it costs him seven times as much to have the blocks cut for printing it, and therefore his profits will be so much the less. It is the lack of knowledge on this, among other considerations, in the preparation of designs offered for sale by amateurs inexperienced in the requirements of the trade, that almost invariably renders them unavailable.

How much may be done by the skilful use

of a single colour is illustrated in fig. 295, which shows how four effects or shades may be gained by using only black. We have here white (the cloth itself), light gray, dark gray and black. If in place of the black we use blue in the same way, we have white, with light, medium, and dark blue, still using but one colour. There are many ways in which a skilful designer can make admirable use of one or two colours; each additional colour greatly increases his resources for new effects, so that to the uninitiated it would always seem that there are many more colours employed than there really are.

In the second method of applying a design (where the printing is done on the threads before they are woven), it makes but little



FIG. 294.—ORDINARY "REPEAT."



FIG. 293.—"REPEAT" BY THE "STEPPING" METHOD.

difference how many tints are used. One dye being of the same price as another, or at least the difference in price being but slight, it is little matter which colour box is brought into requisition. In printing the threads a large drum (illustrated herewith) is used, around which the threads are wound. On one edge of this drum are ratchets as far apart as the width

of a print—about three-eighths of an inch for a tapestry Brussels and half an inch for tapestry velvet. As this drum revolves, a colour box in which there is a revolving wheel passes back and forth under the drum, the wheel in the box

carrying the colour or dye up and printing a line of colour across the threads on the drum during its passage. If the pattern requires the same dye for several loops in the carpet the same colour box goes back and forth the requisite number of times. If a different colour is



FIG. 295.—APPLIED DESIGN. PRINTED FABRIC.

Showing four effects or shades that may be gained by using only black.

required, a different colour box is substituted, until the wool is all dyed, in bands of colours of different widths. The skein is then removed from the wheel, steamed to set the colours, and forms a single thread throughout the length of a breadth of carpet. Thus line after line is taken until enough are printed—no two alike—to form the entire pattern.

For a five-frame body-Brussels but five colours may appear in any one line throughout the length of a breadth. If you wish, five entirely distinct colours may appear on the next line, and so on. Therefore, although there can be but five colours in any one line, still there may be many colours in the carpet.

Opposite is shown a section of a five-frame body-Brussels design with eight colours in all, but so arranged that only five colours appear in any one vertical line, as may easily be seen by the "plant," as it is technically called.

Mr. Alexander Millar¹ broadly divides carpets

¹ "Practical Designing" (Geo. Bell & Sons, publishers).

into three classes (*i.e.* for designing purposes), as follows: (1) Those in which the design is produced by the action of a Jacquard loom; (2) those which may be grouped under the head of Axminster; (3) tapestries. In the first class (in which are included Brussels and Wilton, and also Kidderminster carpets) there is a limit to the number of colours employed. In the second and third there is theoretically none. For designing purposes Brussels and Wilton carpets are identical; either can be woven from a design prepared for the other; in Wilton, however, the design will come out a very little shorter than in Brussels.

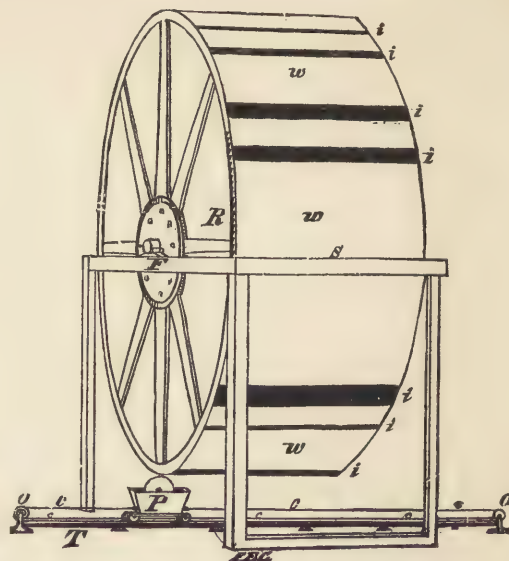


FIG. 296.—COLOURING DRUM USED IN APPLYING DESIGNS.

w, wools; *i i*, colours printed on the wools; *R*, ratchets; *F*, frame to support drum; *S*, where girls stand to comb wools; *T*, track for the colour box; *P*, colour box; *O*, pulleys; *c c*, endless chain for drawing colour box back and forth.

Brussels designs for filling are always 27 in. wide. Borders may be 13, 18, or 22½ in. The most usual width is 18 in. Full-sized design paper is often used, but many prefer a paper which is rather more than half-size—16 in. wide, representing 27 in. Which ever is used there should be 9 points to the inch in the length, and 256 points in the

27-in. width. There is no fixed rule as to length, but from 27 to 36 in. is suitable for small designs, and 45 to 54 in. for large ones. The length should be no greater than is necessary to avoid too frequent repetition of prominent objects.

Axminster does not involve the care of "planting," but it has difficulties of its own. The design is much coarser than for Brussels. The design paper for the latter contains about

particulars of widths and lengths given for Brussels patterns apply also to Axminster in breadths.

Kidder. carpets have their pattern formed mainly by the weft threads (*i.e.* running across the carpet). In Wilton, Brussels, and tapestry it is formed wholly of the warp thread (*i.e.* in the direction of the length). In Axminster neither warp nor weft is seen, the pattern being formed from a third set of threads,

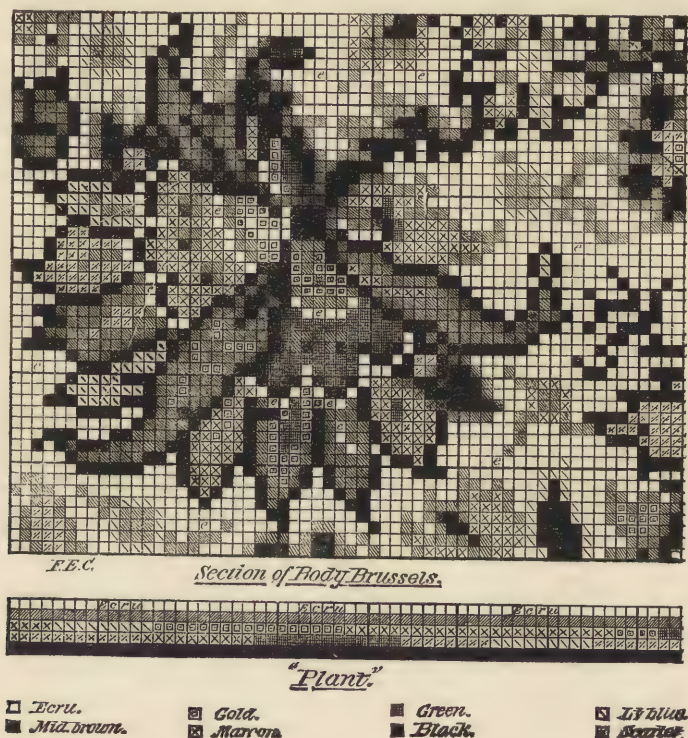


FIG. 297.—BRUSSELS CARPET DESIGN.

85 points to the square inch ($9 \times 9\frac{1}{2}$ nearly); for Axminster it usually ranges between 27 and 70, although the "pitch" (*i.e.* the number of squares or points to the inch) is sometimes finer and sometimes coarser. To hit upon just about the right amount of detail that is practicable under the circumstances is no easy matter. It must be borne in mind that there must be no insensible gradation. Every shade must be level, solid, and clearly defined, no matter how light it be or how dark. The

inserted by various methods, so as to form a pile surface.

In tapestry carpets the pitch is about the same as for Brussels, and the same conditions hold good as to widths, etc. There is no limitation of colour, and a design adapted to a fine grade of Axminster would do for tapestry.

For a thorough comprehension of the technical requirements in carpet designing, Mr. Millar's article, to which we are indebted mainly for the foregoing paragraphs, should be read in

its entirety and carefully digested. We may give, further, the following summary of important points that he makes for the guidance of the novice :—

Make your designs full size, and on ruled or "point" paper. Always keep in mind the "pitch" for which you are working. All manufacturers do not use the same paper, and it is important to find out what are the requirements

bad colour, but good colour will sometimes be allowed to offset defects of form. A Brussels design which is unsatisfactory in colour may sometimes be rendered available by means of "loom changes"; but not so with an Axminster design, to alter the colour of which often involves an amount of artistic work equal to the creation of a new design. Therefore, unless you have a decided talent for colour, do not

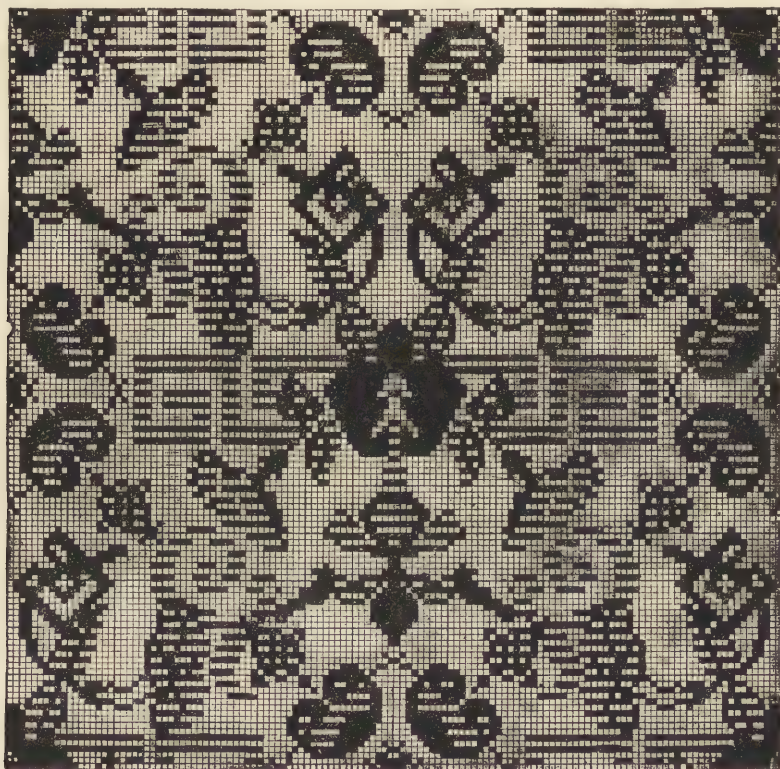


FIG. 298.—WORKING DRAWING (MUCH REDUCED) FOR A TWO-PLY INGRAIN CARPET.

in this respect before beginning your design. As a general thing, 9 points to the inch is the standard for Brussels carpeting, and from 7 to 5 for Axminster.

Assuming, of course, that your design conforms to the technical requirements of the manufacturer, the general colour effect is what will influence him most as to its availability from the commercial point of view. No amount of good ornament will compensate for

attempt Axminster carpets, except for the simplest effects. Mr. Millar also gives the following excellent advice :—

"Never make a design vaguely for a carpet. Always have a definite fabric in view. Having chosen this, study its special requirements as to the number and arrangement of colours, and as to the special ruled paper to be used for it, and keep to it until you have mastered them. Keep a piece of the fabric for which you are

working beside you. Keep also a piece of the special ruled paper from which it is woven, and carry out portions, if not the whole of this, full size.

"Copy out and lay together several repeats of the first rough sketch, to avoid striping and awkward lines."

TILES.

IN an article on "Designing for Tiles,"¹ Mr. Owen Carter classifies as follows the several kinds of designs for tiles: (1) Plain geometrical floor tiling; (2) Encaustic floor tiling, alone or in combination with class 1; (3) Mosaic floor and wall tiling; (4) Plain, embossed, or printed tiles, either alone or combined, for wall surface decoration; (5) Hearth and grate cheeks; (6) Faïence. Designs for all the foregoing, he points out, would be prepared by the combination of a greater or less number of individual tiles worked together to form a pattern, which latter may again be subdivided into (7) Encaustic floor tiles; (8) Glazed embossed tiles; (9) Painted tiles; (10) Painted tiles either with a complete design on each, or united for fireplace panels, etc., or in ceramic pictures illustrating historical or other subjects.

As to the colouring of the designs, Mr. Carter recommends body colours for classes 1, 2, 3,

and 7, and for Nos. 4, 5, 6, 8, 9, and 10 the ordinary water colours in washes. The design is drawn in lead-pencil before the colouring, and if it is a geometrical pattern it should be lined up with a hard pencil or India ink after the colouring. The usual scale for designs for floors and walls is one inch, but half, three-quarters, and one-and-a-half inches are also used if found more convenient.

The study of the illustrated books of specimen patterns issued by the tile manufacturers will give the intending designer much valuable information as to what is required.

In preparing designs for tiles it is well to bear in mind that some colours are more costly to manufacture than others. What are called "plain colours" are the least expensive—these are Buff, Salmon, Gray, Red, Chocolate, and Black. White costs nearly twice as much, and Blue and Green nearly three times as much. Wherever the "vitreous colours" (White, Blue, and Green) are used in a design, the cost of the tiles will be greater than for plain colours.

The usual size of the hearth is 4 ft. 6 in. \times 1 ft., and for the grate cheeks, 2 ft. 6 in. \times 6 in. The usual sizes for tiles for the hearth are 6 \times 6, 4 $\frac{1}{4}$ \times 4 $\frac{1}{4}$, and 3 \times 3. The average grate will take five 6 \times 6 tiles on either side. These are often arranged in a continuous panel design, such as flowers springing from a vase, or a standing figure.

The smaller manufacturers are most likely to buy from outside designers. One of the larger firms is more likely to depend on its own staff of artists.



DESIGN 246.—FOR TILES, DECORATED IN THREE COLOURS.

¹ "Practical Designing" (George Bell & Sons, publishers).

PREPARATION OF WORKING DESIGNS.

IN the preparation of design any mechanical means are permissible which will help the designer to produce in the quickest and easiest way the combination he seeks. He will use rulers, compasses, geometrical curves, and tracing-paper, and any one who attempts to design geometrical patterns for the art trades should be familiar with the use of the scale, the T square, and set square.

For all purposes the design must be full working size, with every detail of manufacture so plainly indicated that the artisan need never be in doubt as to the intention of the designer.

Ruled or "Point" Paper is necessary for preparing a design for a carpet, oilcloth, and such woven fabrics as Nottingham lace curtains, Madras muslin, crêpe, "tapestries," and chenille. It is not employed for designs for wall-paper, woven silk fabrics, or cretonnes and printed fabrics.

The **Colours** used in nearly all cases¹ are powder colours, sometimes called "distemper" or "tempora"; they are the pigments in nearly their natural state, only finely ground in spirits. All are opaque, and therefore have great density of effect. As they have no size in them, it is necessary to mix them with gum-water; but care must be taken not to use so much that they will appear glossy when applied to the design. They will, moreover, turn darker if too much gum is used with them. When you have mixed a colour, test it by applying a little to paper and when dry rubbing it slightly with the finger; if it does not rub off you have used enough gum. Some colours need more gum than others. Carmine will turn black if you use much gum with it; Ultramarine is so absorbent that it needs a good deal.

¹ For tiles and china and pottery decoration generally the design is made with ordinary water-colours. For stained and painted glass the sketch may be either in opaque or transparent colour; the cartoon is rarely fully coloured. For designs for bookbindings both transparent and opaque water-colours may be used.

Do not let the colour settle; otherwise that at the bottom will be of a deeper tint than that first used, so that instead of one shade you will get several. To avoid this, stir the colours frequently with brush or palette-knife. Keep them free from dust. Sometimes, if left undisturbed for several hours, they harden. In that case you will have to regrind them.

The **Palette-knife** should be of bone or ivory; steel will affect injuriously colours of metallic origin.

It is important to produce the result required with as few colours as possible. For Nottingham lace curtains the effect aimed at is imitation by machinery of hand- and pillow-made laces. Flake White only is used, on ruled blue or black paper; yet by this means every detail is reproduced dot for dot and line for line, just as they would appear, with the thread meshes and net effects of the curtain itself. Some of the most beautiful designs of wall-papers are produced in single colour variations of the colour of the paper itself.

Wall-Paper.—After the design is converted into a working drawing by tracing, transfer it with pencil to a sheet of white water-colour paper large enough to leave a quarter of an inch margin all around.

Lay the design, after it has been satisfactorily drawn on thin paper, with a sheet of carbon paper between; let the under side of the design lie on the right side of the water-colour paper, the corners of the two papers being carefully fastened together so as to keep the pattern from losing its position. With a hard pencil follow the lines of the pattern, and when the upper paper is removed the outline will be plainly seen, and you can then trace it more firmly with a lead-pencil. Of course, pencil marks can be erased before the ground is put on, but frequently erasings give the paper a dirty appearance that a neat draughtsman will avoid. Where the design is of flower or leaf forms in their natural shape, a slight variation from the original pattern will not be noticed; but if conventional forms are transferred in the manner described above, the two papers must be held together as if glued, for the least

variation in one figure may make even a greater mistake in another figure, and so on. Faint pencil marks will readily show through the thin wash of a light-coloured ground, but for a dark terra-cotta or brown ground heavier marks will be required.

Now proceed to the colouring. Remember that the colours, being opaque, cannot be erased after they have been applied to the design. Before you put brush to paper see that each tint is as you need it.

When the colour is reduced to the consistency of thick cream, transfer it to a saucer. Wet a fine sponge in cold water, wring it nearly dry, and, having dipped it in the tint intended for your ground, go over the paper, including the margin, first with vertical, then with horizontal strokes. A clear, even wash of smooth, velvet-like appearance will thus be obtained. The lines of the design will show through the tint. When the ground is thoroughly dry, take a camel-hair brush and go over them. No two wet colours must touch or they will run together. To avoid such a disaster, a space of at least a sixteenth of an inch must be left between the different colours of the pattern. To arrange leaves and flowers so that the different colours will not touch will not be easy for a beginner.

Carpets.—Ordinarily one-quarter of the full size is a good scale for the sketch; when there is much detail one-sixth will be a better one. Opaque colour is used in accordance with the directions already given for wall-paper. Make up your mind in advance just how many shades you will use, and in a separate saucer mix enough of each to complete the design. Lay each tint on the paper solidly, uniformly, and distinctly. There must be no mixing of tints on the palette with the brush. If alterations or corrections are to be made, and it is necessary to lay one colour over another, be sure that the colour is put in solidly and that, in drying, it will match exactly the rest of the tint in other parts of the design.

Indicate forms by masses of colour only. Each square must be completely filled and only with its own colour—there must be no half-squares in the design: each square represents

the thickness of a thread in the carpet, and there are no half-threads.

The pencil marks must not show through when the work is finished. Nothing must appear that is not to be literally reproduced in the textile. If outlines are to be part of the design, let them be so indicated that there can be no doubt about the designer's intention as to their actual thickness.

Silken Fabrics.—It is not necessary to colour the designs, but if it be found more agreeable to work in colour, there can be no objection to doing so. For furniture and upholstery silks it is usual to draw on white or tinted paper with a lead-pencil or crayon for outline, using the stump (see pp. 3, 16) for half-tone effects (produced in the fabric itself by interweaving the colours of the ground and figures). Half-tone effects should be used with much reserve, for the richness of a damask is due principally to the contrast between the (so-called) "satin" ground and the close weft of the somewhat duller silk of the ornament. In brocatelle the richness is got by showing a good deal of the raised "satin" figure and very little of the ground.

BOOK-COVERS.

Designs for ordinary "cloth" bindings are made in pen and ink on white Bristol board, to be reproduced as a "photo-zinco" block in the manner described under "Drawing for Illustration" (p. 30). "Solid" spaces of black may be put in with a brush.

Fancy shading, and even cross-hatching, unless the lines are clean cut and well apart, must be avoided. The drawing must be bold and the white lines kept well open. The lines should be as distinct as in a mediæval wood-cut. The design should be as simple as possible. The drawing may be as much larger as you please than the size it is to be reproduced, but be careful that the lines do not come too fine in reduction.

When the design is to be printed in more than one colour, a separate drawing must be made, and a separate typographic block of it

be supplied, for that part which each colour (or gold) contributes to the whole design.

A solid metal electrotype should be made from the "zinco," for it will have to stand great pressure. For that part of the design, at least, which has to be reproduced in gold, usually a die is cut in brass, for it has to stand not only great pressure, but also the heat of the blocking

and for those where a dead gold effect is to be rendered, yellow body colour is used. Sometimes a few touches of gold paint on the face of the drawing are valuable in expressing the intention of the designer. On the back of the tracing-paper it is best to do only what tinting may be desirable.

The decoration of the boards, or sides,



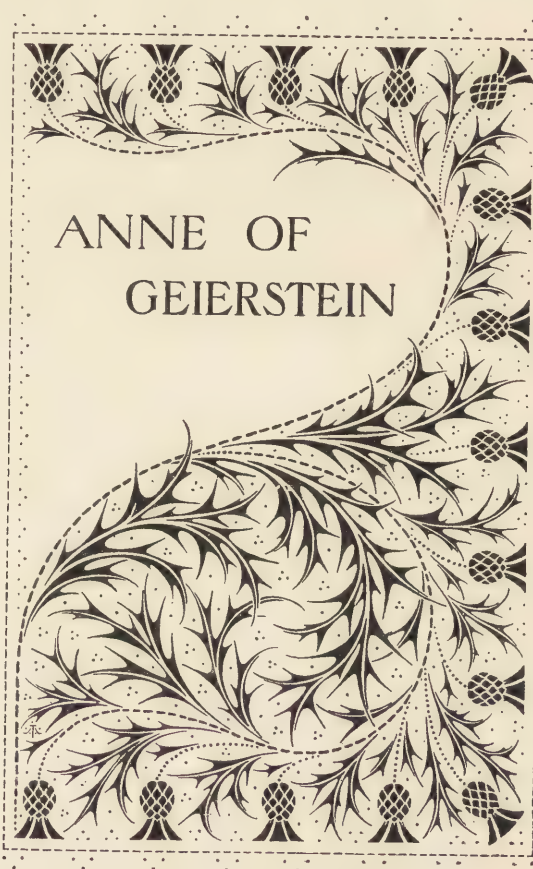
THE
WAVERLEY
NOVELS

DRYBURGH
EDITION

VOL: XXIII



A&C BLACK



DESIGN 247.—BOOK-COVER DESIGN (MUCH REDUCED) FOR A "CLOTH" BINDING.

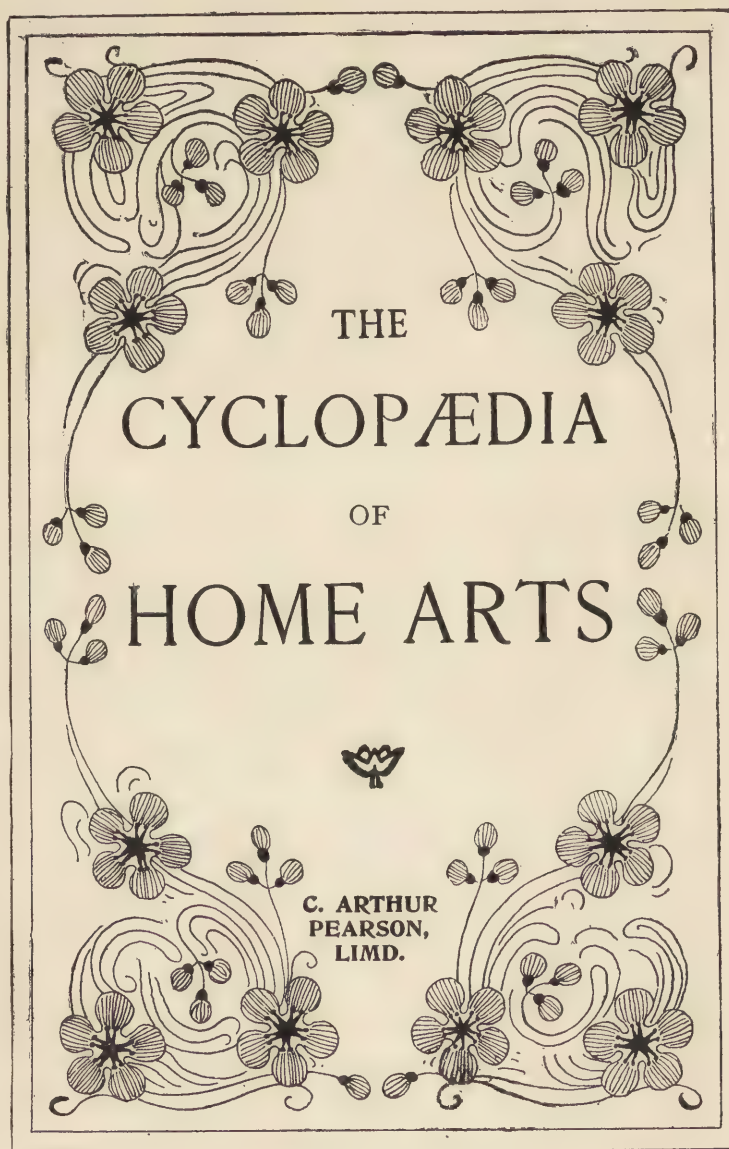
Reproduced (by permission of Messrs. A. & C. Black) from the original, drawn in pen and ink. The design for the back and for the side of the book are drawn on separate sheets of paper or Bristol board.

press and much consequent wear and tear. In many cases, brass dies are used altogether; but they are costly, and when feasible the solid electrotype from the "zinco" is substituted.

The drawing of the gilded part of the design, to be rendered by means of the die, is sometimes done on tracing-paper, yellow water-colour being washed on the back, between the outlines, to indicate the parts to be burnished,

determines that of the back: that is to say, back and sides should be in the same style. If a spray of flowers, or knot of ribbon, or other such free motive be used, it may be carried from the front cover across the back and over on to the other cover. Otherwise only the front board and the back are decorated. A valuable exercise for the student would be to complete design 248 by adapting

the motive to the back of the cover also, in the manner of Design 247. Designs 243, 244, 245 afford similar interesting exercises. In imagination, rule two vertical lines so as to divide the design into three equal parts, he will perceive that the central one will, with a little



DESIGN 248.—THE HAWTHORN. CONVENTIONAL TREATMENT.
BOOK-COVER DECORATION, "CLOTH" OR LEATHER.

the case of Design 243, if the reader will turn this book around so that he views the design in its original vertical position, and will, in

modification, supply the decoration for the back, for which Design 243 furnishes the decoration for the sides.

MISCELLANEOUS.

RETOUCHING NEGATIVES.

ARTISTIC training is decidedly an advantage to those who undertake this work. The merely mechanical manipulation is very quickly learned; but the retoucher must be possessed of good judgment. It is a delicate matter to know just how far to go. With most negatives you must learn to temper justice with mercy; but with too much of the latter quality you are likely to obliterate the likeness.

Still, retouching is not simply beautifying; it is first of all a matter of mere justice. The photograph light, when used to obtain a strong likeness, is sure to exaggerate shadows and forms. Retouching simply softens sharp outlines and renders the shadows more transparent. Colour is also sometimes exaggerated. Take, for instance, a child with very red cheeks, and they will be dark in the picture. This would be a disfigurement were it not for the softening effects of the retouching. Indeed, so far does the work of the skilful retoucher go that he can make a good negative out of a very bad one. This latter process is often necessary when it is impossible to get another sitting.

The negative to be retouched is placed in a wooden frame with a ground-glass back, arranged so as to incline at a convenient angle for the worker, and to let the light shine through—this latter office being assisted by a reflecting mirror beneath the glass. A black cloth, in form of a canopy, excludes the light from coming in about the worker's head, and all the space at the back except the part of the negative to be retouched is darkened. As you can only see the imperfections of your negative and the places where you are to work by letting the light shine through it, the object of all this preparation is obvious.

The best retouching pencil is the old-fashioned

one of real lead, but in graphite the next best is the Faber H.H.H. A kid stump, some mineral paper, or red ground-glass varnish may be also necessary; but these are only for the use of the experienced worker, and will be referred to again. To prepare the negative so as to get a "tooth" for the pencil, put on it a few drops of "madoleine," a varnish composed of turpentine and resin, and rub with the finger gently over the surface till it is evenly distributed.

A beginner usually is given several negatives to work on first, simply to see what he will do. No instructions probably are given to him. Some novices show aptitude at once. To such, suggestions are given by the photographer, who lets them begin on the most unimportant work—for example, smoothing out imperfections of flesh on arms and hands. They are next "put on" the face, and so on until they develop the capability of actually changing forms, making hollow cheeks plump, filling out a bit of drapery, and cutting off excrescences, such as angles of hair or dress trimming.

When the beginner comes to the face, he is first set to removing freckles or other blemishes of the flesh. It is sometimes a good plan to have a proof made from the negative before retouching, so that he may see the direct result of its shortcomings and just where the remedies should be applied. It is a little difficult for him to understand at first that every touch of black he puts on the negative means a touch of white in the print. Only by much practice can he accustom himself to this peculiar way of working. When he sees a line, wrinkle or freckle unpleasantly pronounced in the print, he finds a corresponding white line or spot in the negative, and these he must darken with his pencil. But he must be very careful not to do too much. The little white spot must be very delicately treated.

Suppose that he is removing a freckle: he must not exceed the space it covers, neither must he make the portion treated more opaque than the parts of the surface around it, else he will have white spots in the print. You see the mere removal of skin blemishes calls for care and discrimination.

Now we come to the lines in the face, and here is where the nicest judgment is to be used, and the mechanical gives way to artistic instincts. Freckles and other defects of the flesh are the only things in the face that should be absolutely removed; lines and wrinkles ought never to be entirely eradicated, else much of the character of the likeness will be lost. They are at most only to be very much softened, so as sometimes to leave only the slightest indications. One should begin with the forehead and the lines about the eyes, but leave the mouth alone. That is the one feature that will bear no trifling with. The likeness lies in the mouth. Let your friend put on a wig or spectacles, or in any way change the upper part of his face, and he is still your friend; but let him, if he can, in any way disguise his mouth, and you do not recognise him. Fold a piece of paper and lay it under your upper lip, and notice how instantly it changes your face.

A retoucher should have some knowledge of light and shade in pictures. He should know something of the value of a high light or a mass of dark, and should note carefully how the light has fallen on the sitter, also whether it is a direct light or a reflected one. This knowledge is especially necessary where he is to supply lights that are entirely lacking in the negative. Suppose he finds that his print is flat and tame. Clearly the way to improve it is to put in some lights here and there. Perhaps the hair may need a few sharp lines, care being taken to follow the curves of the locks; or the modelling of the face may be strengthened by a delicate lightening of the prominent portions. Accessories, such as drapery or furniture, often need little skilful lights to give them character or to add to the general effect of the composition.

RESTORATION OF DAMAGED CHINA.

To restore broken china not merely by sticking together the fragments, but by substituting missing portions, is quite within the abilities of the amateur; the work entails little skill or expense, and success in it is chiefly a matter of patience.

No matter how clean the fragments appear to be, they should be well cleansed with soap and tepid water; in cases where they are obviously greasy and dirty, the pieces should be soaked for some hours in a solution of potash. After being rinsed in clean water, let them be dried thoroughly, remembering that as earthenware, being more porous, holds much more water than porcelain, so it dries more slowly. It is always best, if possible, to repair a breakage immediately it has taken place, while the edges of the fractured parts are sharp and unchipped. If these are allowed to stay a long time, they are almost sure to get chipped, and so the joint will fit less closely, and the restoration be not only far more difficult, but show a much less neat result.

For trifling articles, small plates and the like, cement may be sufficient to impart the required strength; but for heavier pieces rivets are absolutely necessary. It is a task of no little skill to insert these so that they are not visible until the article is examined closely. For a dish it is possible, of course, to insert them at the back, so that they are not apparent until it is turned over; but for vases, jugs, and many other articles, it is almost impossible to fix them from the inside. With regard to the best cement, it is hard to single out any for special praise, but gum lac preparations should not be employed, even when allied with rivets, for heavy pieces. Silicate of potash cements, excellent as they are for glass, should not be used for pottery.

It is well to remember that all cements lose much of their power when applied in damp weather, unless special precautions are taken. In any humid climate the mending should be done in a warm room and the frag-

ments heated in an oven or warmed separately over the flame of a spirit lamp before the cement is put upon them. The bottle containing the cement itself should be kept standing in a jar of warm water at one temperature while it is in use.

When a piece is much shattered, it is often impossible to build it up at one operation; for instance, a precious "six-mark" cup of old blue and white egg-shell porcelain was several days in progress. First, some of the tiny fragments were fitted to each other, then by



FIG. 299.—THE RESTORATION OF DAMAGED CHINA OR POTTERY.

degrees more were added, course by course as it were, until the sides of the cup were built up. Before adding a broken piece, it is a good plan to tilt the vase or whatever the article may be, so that, speaking roughly, the loose piece would balance itself in place even without the aid of cement. This is hard to describe; but supposing an outstretched hand has been broken off a statuette, it is obvious that if merely stuck on while the figure was upright on its base, the weight of the hand would help to open the joint. Now, the closer the pressure while the cement is setting, the better. Therefore if the figure be laid on its back and

propped up until the stump of the arm is so level that the hand may be balanced upon it, it is evident that the weight of the broken fragment will help to press the joint firmly together. This is the principle to be followed throughout the operation. After all the pieces are reunited, any fissures that may be apparent, owing to the chipped edges of the fragments, should be filled up with a small quantity of the finest plaster, made into a paste with water.

When the breakage leaves such results as those indicated in figs. 301 and 302, the fragments may be further supported by a wire inserted as the illustrations indicate. Holes must be pierced in the ware to affix this wire, but they need not pass right through. For drilling, an ordinary centre-bit tool will often be found sufficient; but when the material is very hard, the end of the drill should be kept moist with spirits of turpentine. Use only copper or galvanised iron wire; ordinary iron wire will rust, and so should never be employed. Secure the ends of the wire with gum lac. The loose gum lac is stronger than the sort prepared in sticks.

To restore the handle of a jug, insert wire as shown in fig. 302, and build up the handle around it; the wire should be secured very firmly before the plaster is moulded into shape. If there are no pieces missing, the wire should still be used in sections where it can possibly be inserted. For a larger handle, use two wires and lace them together, until a sort of lattice girder is made, on which build up the new handle. For large dishes a somewhat similar course may be followed. Fig. 299 shows how such a framework should be made. For a paste to restore missing portions, take some Spanish white in powder, mix it with strong gum-arabic upon a piece of glass with a palette knife. To make it very hard and durable, temper it with a little alum solution. After it is dry scrape off superfluous portions and polish with glass paper.

For restoring the colour upon portions built up of new material, water colours should alone be used. Having filled in the missing parts

with plaster of Paris or with the paste just described, allow them to dry and size them with gelatine. Give two coats, and let the first be quite dry before applying the second. Gum

they are difficult to remove. Fill up the design with water-colours of the right tints. If gold is needed, use only the very best, prepared in shells; and if silver be required, employ only aluminium of the best quality.

Finally, to impart the high glaze to the new portions, apply a coat of the best Sohnée varnish, and when this has dried add one or two others, until the surface has acquired the desired polish. The effect of articles so mended depends entirely on the patience and neatness of each step in the process, and when carefully done with well-matched colours is hardly noticeable. These directions throughout are intended to refer to valuable show pieces only, and must not be held to apply to tableware or articles in actual use.



FIG. 300.—THE RESTORATION OF DAMAGED CHINA OR POTTERY.

water or starch may be used in place of the gelatine.

To copy the colours of the original, squeeze out some moist water colours upon a palette and mix them with a palette knife until the ground colour is matched; then add a coat of this and leave it to dry. If the colour is not quite right—it often changes in drying—add another until the match is perfect. To restore the decoration, if the pattern is a repeating one—as in fig. 192, for example—it will suffice to copy with a pencil the portion between the dotted line. Trace the design, whatever it be,



FIGS. 301, 302.—THE RESTORATION OF DAMAGED CHINA OR POTTERY.

very carefully, and then, placing the pencilled side on the place, retrace it with a hard pencil; this will transfer a faint but clear outline to the plaster. Avoid any false pencilled lines, as

"EXTRA ILLUSTRATING," OR "GRANGERISING."

"EXTRA illustrating," as the term is used by collectors, means gathering portraits of the persons and views of the places mentioned in any given book, and having the book handsomely rebound, with each portrait and view placed opposite the page where it is mentioned. Drawings, water-colours, prints or photographs, autographs—indeed, all things of the kind that pertain to any person or incident mentioned in the book—have a claim to a place in it. The pastime is fascinating and pleasurable, for pleasure consists not so much in the acquisition of a desired object as in the pursuit of it, and book illustrating is a constant pursuit of coveted prints. It is, moreover, instructive, because the collector makes himself acquainted with the history of the persons mentioned in the book he is illustrating, which leads him to read other books, and in time he becomes thoroughly conversant with the history of the period of which his book treats. The hobby is closely allied to "bibliomania," and is generally indulged in by persons who have fine libraries.

As there are books *and* books, so are there illustrators *and* illustrators. One man will be

satisfied with the work of a professional illustrator, to whom he will send a volume to be thus interleaved; another will gather his illustrations from many sources and select such as his own taste decrees fit; another will embellish the work with numerous fancy head and tail pieces appropriate to the subject; and yet another—and happiest is he—who, with ready pen, pencil, and brush, can add a copy of some portrait yet unengraved or the sketch of a locality still unlimned. How it makes a brother-collector's mouth water and his fingers itch to see such within the leaves of another's book, which he, too, is illustrating!

One illustrator will be satisfied to have his print, autograph, or letter in any state, merely because he has it on the list, and once obtained that particular item can be stricken off; another may buy in succession a dozen impressions of one desired print, and yet keep on the look-out until the volume is finally bound for a still better impression of it.

In London in 1769 appeared the first edition, 2 vols., 4to, of a book which was the immediate forerunner of all books illustrated by interleaving. Its title, sufficiently comprehensive, was

"BIOGRAPHICAL HISTORY OF ENGLAND FROM EGBERT THE GREAT TO THE REVOLUTION; consisting of characters disposed in different Classes and adapted to a Methodical Catalogue of Engraved British Heads. Intended as an essay toward reducing our Biographies to a System, and a help to the knowledge of Portraits; with a variety of Anecdotes and Memoirs of a great number of persons, not to be found in any other 'Biographical Work.'"

The preface also speaks of the utility of a collection of English portraits to supply the defects and answer the various purposes of medals.

The author was the Reverend Dr. James Granger, and from him this particular method of illustrating takes its name. Living from 1723 to 1776, he was educated at Oxford, but left without taking his degree, and upon entering into holy orders was presented to the vicarage and living of Shiplake, Oxfordshire. In the dedication of his book to Horace

Walpole he states that his "name and person were known to few at the time of publication, as he had the good fortune to retire early to independence, obscurity, and content. . . . If he had an ambition for anything it was to be an honest man and a good parish priest."

Immediately on the publication of his book the leaven began to work. "Five shillings," says Fitzgerald, "had been considered by collectors a good price for any English portrait, but at once books with portraits rose in price to five times their original value, and few could be found unutilized."

Both pompous Dibdin and genial Burton, who were book-lovers of the same degree, but who differed in kind, were bitter enemies of Grangerising, and ridiculed the practice, giving ludicrous examples of book illustrating run mad, the one showing how the first two or three verses of the Bible might be illustrated, the latter taking the first verse alone of "How doth the little busy bee." Burton looked upon it as sheer murder—the tearing out the vitals of a friend; and we can imagine the name he would have given the Grangerites had he been living to-day.

But we trust that no one who becomes a book "illustrator" through reading this article will mutilate a really rare or valuable book.

In selecting a book to interleave, you may either fear being too ambitious, and obtain "just a little one to begin with"; or you may start on some historical work, city, county, or national, and continue making volumes out of it indefinitely.

How to split Paper.—Every book "illustrator" should know that seemingly impossible thing—how to split a piece of paper.

It is a very simple matter, and it is said that when it was first discovered in England it was applied so successfully for duplicating bank-notes that the bank authorities were driven to adopt a special paper that would baffle all attempts of the sort. For the innocent purpose of removing the printed matter that so often backs a fine impression of a woodcut or a "process" block the device is invaluable, and the process is not a complicated one. Given

practice, patience, and pluck, a satisfactory result is certain.

Having selected the print you wish to detach—which in the first trial should be a worthless one and of small size—trim the margin to a half-inch all round the impression. This is supposing the whole print is about the size of a cabinet photograph. Then have ready some common wheat-flour paste, newly made—which is a very important point, as paste even a day old is apt to spoil the whole operation. Take then two stout pieces of firm linen, muslin, or similar material, a little larger than the print. This should be unwashed stuff—the sort used for rolling window blinds answers admirably. Whatever is chosen must be smooth, firm, and strong. Paste a piece of the stuff on each side of the print. Leave them to dry under pressure, and when nearly set, but not rigid and completely dry, pull the two surfaces asunder with a firm and very even force. Herein lies the whole art of the process, and here also comes failure at first, as the print will either refuse to start splitting, and you but peel off one surface of texture, or else it begins well and tears instead of separating into layers before the whole surface is split.

When you find that the sheet so treated has behaved satisfactorily, and that each piece of linen has a film of paper intact adhering to it, take the one you wish to preserve and soak it in water. Then lift the tender film very gently and mount it with starch upon a suitable piece of cardboard. When mounted, wash all the paste off the right side of the print with a camel's-hair brush dipped in water. Do this very thoroughly, and then leave the whole to dry under pressure, and the result will astonish all who see it. The film thus gained looks like what the printsellers call an "India proof"—*i.e.*, a proof printed on India paper. It is so transparent that if, without margin, it is mounted on polished white wood it looks like a transfer picture. Experts at the trick can treat a print of any size in this way with perfect success, and transfer from an illustrated journal, that otherwise would probably be thrown away, a fine impression well worth framing.

TAXIDERMY.

I. SKINNING AND PREPARING.

AS an art, Taxidermy is strictly of modern inception. The Greek words which make the designation—meaning "arrangement" and "skin"—express, collectively, its essential nature: the *arrangement* or manipulation of the skins of animals; practically, the removal and preservation of skins, which are either placed, unmounted, in cabinets, for examination and study; or subjected to the more complex arrangement of stuffing, mounting, and adjusting, to counterfeit as near as possible nature's likeness, and to express the characteristic habits of the individual.

Taxidermy calls for peculiar abilities. To be eminent in the art one must possess such faculties as will naturally place him higher. He must have the artistic faculty. It is not enough that he perform the simple mechanical manipulations: many such are known all over the land, and many such produce pleasing work. But there are higher possibilities. An eye for modelling is requisite. After the skin is preserved and ready for mounting, the more the operator is possessed of the faculty that makes the sculptor, the nearer he will succeed in modelling skins that express the characteristic habits of position. The details of the best work are considerable: the eyes are carefully made in glass, and the characteristic shapes of pupils and canthi and colour of irides are shown.

It is quite within the reach of the *amateur* operator to become skilled in the various manipulations required, and an ordinary amount of mechanical ability will prove sufficient for very pleasing results. Select a large bird or small quadruped for practice—a hen, we will say. The few tools required are readily suggested and easily procured. Any convenient knife, something after the shape of a paper-cutter or scalpel; a pair of stout, short-bladed shears; a lighter pair; forceps, which are exactly like those used by surgeons for dissecting; and a longer pair, with handles. The tools are shown in fig. 303. One might add to them a large

skinning-knife, a pair of tow pliers, and a large and a small file.

Having the bird in hand, proceed to plug with cotton all holes made by shot, and the natural openings, to prevent blood or injecta from soiling the plumage.

In the field, when specimens are reserved for mounting, they should be placed in a cone of paper, head downward, the tail being neatly covered by folding a portion over it. We now



FIG. 303.—TOOLS AND MATERIALS USED IN TAXIDERMV.

place the bird upon the table, and separate the feathers, when they are sparsely set, in a line with the breast-bone. Make an incision through the *skin only*; have at hand a dish of oatmeal or plaster of Paris to apply freely to grease or blood, that the feathers may not be soiled. The edges of the incision are apt to curl inwards; by treating them thoroughly with the meal they are protected from this evil.

The incision having been completed from the *lower end* of the breast-bone to the vent, careful manipulation with the forceps and fingers, and at times with the back of the knife, will suffice to remove the skin on both sides as low down as convenient. Place the thumb and forefinger of your right hand over the skin of the breast, press downward, and you will expose the whole breast to the neck,

as seen in fig. 304. Now thrust a stout hook through the breast, beneath the "merry-thought," or in any position to sustain a strong pull; suspend the hooked body from above, as you can then the more conveniently handle it. Now sever the neck, as seen in fig. 305. Lay hold of a wing, pushing down, at the same time opening a place under the wing by aid of your fingers, in which place your scissors, and cut off at the shoulder, as in fig. 306.

Having cut off both wings, much care is requisite in separating the skin from the back. Here is the most delicate work; use great care as the loins are reached. Now take hold of a leg at the lower joint and press the skin down carefully with the fingers; insert the scissors at the joint (the *knee*, properly), and sever as in fig. 307.

Carefully force down the skin to the base of the tail and cut off; the oil sac and adhering flesh should be removed also. The legs may now be stripped of all flesh and fat—indeed, all fat should be carefully left on all parts of the body, so that the skin may be as free as possible from it. The wings may now be stripped, care being taken to use the fingers in forcing down the skin. Remove the flesh from the bones of the wings and legs. Do not separate the shafts of the feathers—which are now seen adhering to the bone. In large birds the wing may be conveniently opened from the outside; an incision made on the under side will allow room to remove the flesh.

Having now removed the body, and properly cleaned the wing and leg bones, we may very easily strip the skin down from the neck. Before doing this, introduce the hook into the severed end of the neck, and suspend the skin, head downward, from above. The skin will leave the neck very readily, but as soon as the skull is reached manœuvre carefully. Patient manipulating with the fingers will remove the skin from nearly all birds' heads. Owls and a few other birds will require a slit made in the neck at this point, which may be sewed up before the skin is turned. The ear openings are first encountered; the membrane, which covers them should be carefully pushed off the

skull by the finger-nail, or a blunt stick; little cutting is required. Then the eyes: carefully



FIG. 304.—SKINNING AND PREPARING THE BIRD.

push the skin away until the eye-socket is completely exposed. The membrane which holds the skin in place around the eyes should



FIG. 305.—SKINNING AND PREPARING THE BIRD.

be separated so skilfully as to leave the eyelids of the skin perfect in their borders. Push the

skin farther down towards the bill, and then remove the eyes and all flesh that can be separated from the skull. Continue the skinning to the base of the bill. The under jaw should be denuded of its flesh; the tongue and all soft parts in this region removed. The base of the skull should now be cut through, removing a part of the roof of the mouth; the brain is now entirely removed, and all other soft parts.

The preserving process is now in order. Have a wide-mouthed bottle of *pure* arsenic, which should be plainly labelled POISON!—and kept securely stopped, and away from all other



FIG. 306.—SKINNING AND PREPARING THE BIRD.

articles. With a common painter's "sash tool" or brush apply the dry arsenic freely to every fleshy part that can be reached. Begin with the head. Apply the arsenic to the eye-sockets very freely, to the interior of skull, and then fill these parts with cotton. The mouth and jaws will require a thorough poisoning. Apply the poison freely to every other part, working it well into the wing portions and into the legs. Arsenic is not deleterious, used in a proper manner; it is deadly poison taken into the stomach. The worst that happens to those who use great quantities, or handle it with

abraded or cut hands, is a slight soreness in the more tender parts, as under the nails; this is



FIG. 307.—SKINNING AND PREPARING THE BIRD.

avoided very considerably by oiling the hands, or washing them in glycerine. The arsenical soaps are prized by some, but we much prefer the dry powder, as being more convenient and more efficient. The legs of the bird and the bill should be varnished, to preserve them from the attacks of insects. The skin is now ready to turn into its proper shape, when the feathers must be smoothed into place, and if the skin is to be only used for examination or study, it may be filled out with cotton and arranged in the shape seen in fig. 309. Before this is done the wing bones should be tied, on the inside, to each other, leaving a space between the ends of about an inch—or sufficient to allow the wings to assume a natural position. The leg bones should be wrapped with cotton. To make a neat cabinet specimen, like the fig. 309, a piece of pine wood is wrapped with tow or cotton, and the upper end passed on to the skull; the lower end projects a little to allow the specimen to be handled without disturbing the plumage. The skin is now neatly brought into shape and sewed.

White feathers that are soiled may be cleansed by washing in soap and water, and repeatedly dried off by sprinkling with plaster of Paris.

To skin and preserve a quadruped the pro-

cesses are so similar that any one having sufficient skill to do the one may successfully cope with the other.

II. MOUNTING.

Our specimen is now neatly filled with a temporary body, the skin having been thoroughly poisoned and preserved, and made pretty surely proof against the attack of insects, and not subject to decomposition; this indefinitely, if proper manipulation is observed.

In this condition it is useful for study, and is in the required state for the cabinet. Should the specimen, however, at any time, be selected to "set up," the following course may be followed:—

In a sheet of *cotton batting* closely envelop the bird or quadruped, allowing several folds to cover it. A coarse cloth, well saturated with clean water, is wrapped loosely around the cotton, and the whole set aside for a few hours. At the expiration of twenty-four hours the smaller skins are softened sufficiently, and will be found to be much in the same condition as that of a freshly-skinned animal. The moisture

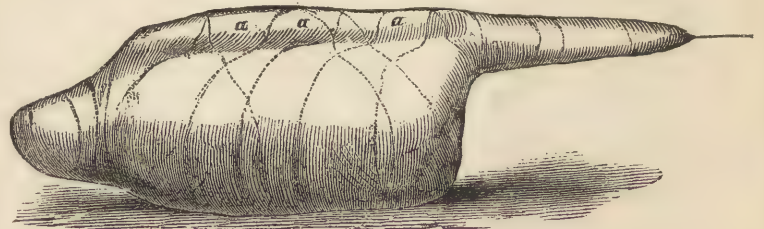


FIG. 308.—MOUNTING THE BIRD.

The parts *a, a, a*, should be sewn through, to form on each side a depression suitable for the fitting in of the wing bones when the body is in place.

has penetrated to all parts, and the roots of feathers or hair are so pliable that the exterior

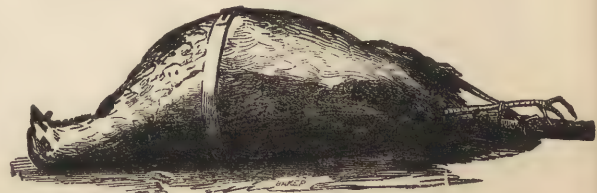


FIG. 309.—MOUNTING THE BIRD. THE COMPLETED BODY.

portions may be easily smoothed and returned to their proper places.

We now arrive at an important division of our subject—that which calls for the “counterfeit presentment” of life, which will be more or less successful as we possess skill in manipulation, and an eye to reassemble the parts after nature’s pattern.

Naturally we would select a fresh object, one that we may skin and mount at one sitting, before the parts become dried. The processes are much the same in each case. Our specimen in hand, and thoroughly softened, we remove the temporary stuffing. With soft hay or moss form a body—cotton is not used for this, as the necessary wires cannot be thrust into such a body easily—wrap tightly with “shoe thread,” or similar, using the thread very freely, and carefully moulding the body, as we proceed, to resemble the natural body. In case of having a fresh specimen, the body should always be before us until this process is finished. In fig. 308 the parts *a a a* should be sewn through to form on each side a depression suitable for the fitting in of the wing bones when the body is in place.

An iron wire sharpened at each end is thrust along the back, and clinched at the large end of the body, the opposite or anterior end to project a little, upon which we now wind cotton or soft tow, to form the neck, all being tightly secured with thread, and moulded neatly to match the natural neck in size. Fig. 309 shows the completed body.

The skin is now laid out, and the sharpened neck wire thrust through the skull, and out from the forehead a little, to give room to adjust the neck at proper length. The wing bones are tied together, a small space being left between the ends, about a half-inch for small birds. The skin is now brought carefully over the artificial body, and the feathers neatly adjusted. If there are any soiled feathers, as is frequently the case, they should be cleaned before the process goes further; this is done by washing in soapy water and freely absorbing with plaster of Paris powder, the latter to be repeatedly alternated with washings,

and at last used until the feathers are entirely dry.

Wires are now prepared for supporting the body. Two iron wires, the same in size as used for the body, are sharpened and thrust through the feet and legs, and into the body, following along the leg bones, upon which should be wound cotton or tow to fill out the thighs. The sharpened end of one of the wires is seen in fig. 310 near the breast, where it is turned in to stiffen the hold upon the body. A better way is to clinch the two wires at the same point, and turn them both into the breast. The skin is now adjusted around the body, and the parts brought together in front. With a needle and thread the edges of the incision are carefully secured; the skin being tender, some care is requisite in this operation. If the body is correctly proportioned to the skin it will be readily accomplished. We have now a structure sufficiently complete to support itself stiffly when the leg wires are made fast.

A stand is prepared, perch or flat disk, according to the nature of the bird (some perch habitually, while others always alight and progress upon the flat ground). The leg wires are now passed through the stand and the bird brought up into shape as in fig. 310. You will readily perceive that the wires of the neck and legs are susceptible of considerable flexion, and in the judicious manipulation of this framework lies the secret of good taxidermy. The neck may be bent in any position you may choose that corresponds to nature. The feathers require adjusting, the wings to be placed, and the whole body carefully smoothed. In these operations the surgeon’s forceps will be found useful. The wings require pinning; for this purpose iron wires sharpened are useful, the ends left protruding sufficiently to catch the loops of thread which will be wound over the feathers as a last operation, as in fig. 311. A bit of wire looped over the tail compresses and spreads the feathers neatly. After the bird is fairly mounted in this manner, it is usually necessary to examine the throat and eye sockets and supply the needful stuffing of cotton to fill out properly those parts. The

bill should be wound by a thread to close it, and this, with all other temporary appliances, should be allowed to remain for several days,



FIG. 310.—THE BIRD BROUGHT UP INTO SHAPE ON THE STAND.

The leg wires are passed through the stand. Like those of the neck, they are susceptible of considerable flexion, and in the judicious manipulation of this framework lies the secret of good taxidermy.

when the parts will be thoroughly dry. The eyes are replaced by excellent glass substitutes, which are readily obtained.¹ Most small glass eyes are provided with wires, which may be plunged into the stuffing. Hence it will be well to have the stuffing of the eyes of the same material as that of the body, as the wire does not easily penetrate cotton. The eyelids are carefully drawn around the glass eyes sufficiently to hold them in place. Eyes are made to imitate all known forms, and the various colours of irides are well executed. Among the larger kinds, those required for quadrupeds, great excellence is attained; the peculiar forms and positions of the pupil are observed.

¹ These, as well as all the tools and appliances, can be had of Mr. E. H. Meek, 56, Brompton Road, S.W.

Our specimen is now in the condition of that in fig. 311—well wound with thread, the feathers in place, the tail spread, and the correct position assumed. It is customary to leave the wire projecting out from the skull until the skin is well dried and shrinkage has ceased; it may then be cut even with the skull and the part carefully concealed by feathers.

We assume that a specimen prepared in the thorough manner herein described will remain indefinitely unharmed by moths or other noxious insects. The arsenic powder carefully introduced into every part of the fleshy portion is sufficient. It only remains to say that it is always difficult to poison the internal portions of the legs and bill, therefore we apply a solution of corrosive sublimate to those parts, and eventually varnish them; this done, it is pretty safe to say that the specimen will remain intact.



FIG. 311.—MOUNTING THE BIRD. THE LAST OPERATION.

The feathers require adjusting, the wings to be placed, and the whole body carefully smoothed.

We can add one very important item of interest. In the very common event of the reader having specimens of skins that have

not been properly poisoned, as many that come from abroad are not, it is desirable, should the skins show evidence of the presence of moths, or anthrinæ, or their eggs, to rid them at once of the pests. Dip the skins into pure naphtha, and, after a thorough soaking, dry very quickly by steam. The evaporation is so rapid, and the naphtha so clean, no injury whatever is done to the plumage; neither to the colour nor texture.

III. INSECT TAXIDERMY.

At the Museum of Natural History one may see beautiful work of this kind, each species of insect being illustrated by a prepared specimen of the various phases in which it appears, from the egg to the perfect form. The plant on which the insect feeds is arranged with the specimens, together with the nest that each makes. The worms are emptied of their contents and preserved with much care, showing the various stages; many of them are of brilliant colours, and retain a very natural appearance. The cocoons and the silken or other products are also shown. In some instances spiders' nests prove to be made up of tough and beautiful silk.

The art is within the reach of the young amateur, and a tolerable exercise of ingenuity will produce very interesting results. The principal manipulation is with the worms or larvæ. You wish to preserve, for example, one of the great green worms that you find eating your grape-vine. Make an incision across the posterior portion, just sufficient to include the end of the alimentary canal; press the contents of the worm out through the opening, gently, and with special care in the case of the tussock-moth worms and others that have hairy or other appendages. Though seemingly a hazardous thing to do (as respects the integrity of the specimen), yet the most delicate hairy caterpillars may be very successfully emptied of their contents. Indeed, they

are by this process so cleaned internally that, practically, they are *skinned*, and you have the skin now to deal with.

Select a good straw, of size proportioned to the specimen; this is to be used as a blow-pipe, and should, therefore, be a whole one, and several inches in length. Introduce the straw carefully within the cut end of the worm, and tie the end around the straw with fine silk. If the operation of squeezing has been successful, it remains to inflate the body for preservation. Prepare a dish of live embers, and over these hold the specimen—using great care in the degree of heat applied. While holding the worm in this way, keep it inflated. The form which the insect is to assume for the cabinet should be considered while this drying process is going on. Some light wooden frame, such as will be readily suggested to the operator, will often be of service to hold the specimen in the proper position. Some worms may require to be curved, or put into a shape characteristic of them while living. Attention to these points will contribute greatly to the value and pleasing appearance of the specimen. The straw, after the drying, is cut off near the body, as it is convenient to allow a small portion to project outside, so that the specimen may be pinned to the cabinet through it, thus avoiding the injury that results from passing the pin through the body.

The specimen is now complete, unless we choose to adopt some method of poisoning it. Corrosive sublimate, which is sometimes used, is likely to injure the colours. A strong arsenical solution may be applied with a brush, safely, as regards the colours. Caterpillars prepared in this manner preserve their colour and form nearly perfect, the hairs and other appendages retaining a remarkably natural appearance, which, of course, enhances greatly the beauty and usefulness of an entomological cabinet.

An extended field is open to any one who may practise this branch of taxidermy.



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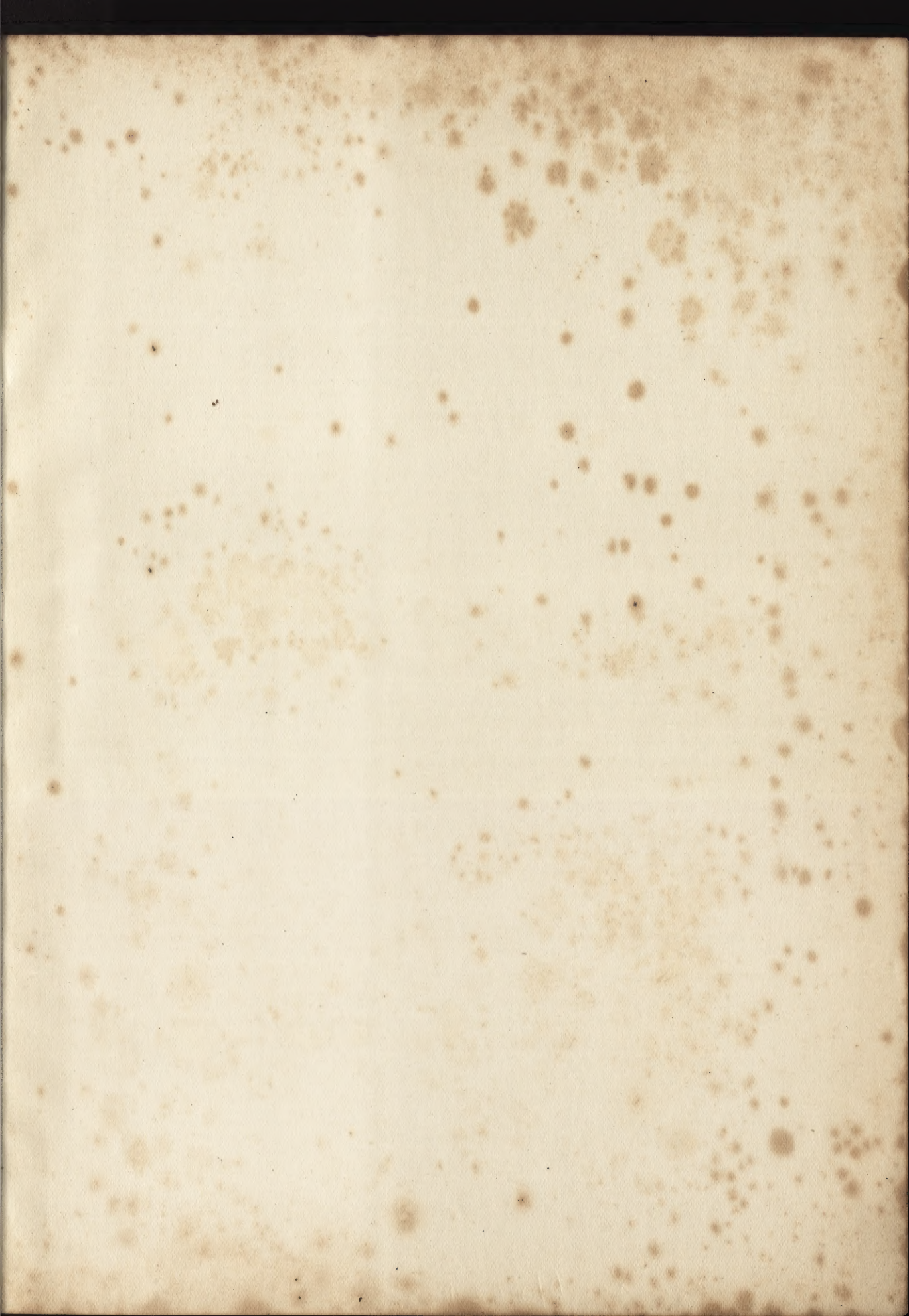
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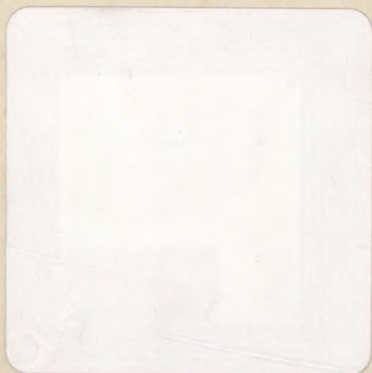
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